



**An exploration of ICT for graphic design education at a public university:
issues of ideation and pedagogy**

by

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DECLARATION

I, **EDWARD APPIAH**, declare that the contents of this thesis represent my own unaided work, and that the thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.



May 27, 2014

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ABSTRACT

Design education has been fundamentally changed by computers and new digital technologies. New ideas and new frontiers have emerged. Available literature shows ICT has revolutionised design education through the online studio and blended learning. In response to the growing needs of ICT in design education, new courses are being designed, while collaborations on design projects are emerging owing to virtual design studios (VDS). Researchers in design, especially in professional architecture and engineering, believe that ICTs enhance the teaching and learning of design.

The adoption of ICT at the various stages of problem solving has not yet been reflected in the teaching of graphic design, especially in idea development. In developing economies, in the recent past, more attention has been paid to graphic design pedagogy, as it particularly relates to using ICT in ideation. Using the 'multi-method' approach, the research captured both quantitative and qualitative approaches in a pragmatic paradigm. It explored how ICT has affected the teaching and learning of ideation in graphic design in a university in a developing country. This included investigating pedagogical models and paradigms that had informed graphic design education since the incorporation of ICT. It surveyed ICT methods and the players involved in graphic design education, and documented the everyday experiences of students and educators in the lecture rooms to obtain a more holistic impression of teaching and learning. Empirical evidence suggests considerable access to computer and ICT methods by students especially. Various perceptions on the use of ICT by students in ideation activities as far as graphic design education is concerned, and how ICT is informing ideation, were also captured through the data.

The study revealed activity systems of ICT integration as something that created contradictions. The contradictions were characterised by activities of collaborations and uses of ICT by students on one hand, and lecturers on the other hand. There were significant revelations of the development of the graphic design processes of using ICT in ideation. Ultimately, they were revelations of complexity of the design process for which there were no precise and fixed formulas that bring together form, function, and context conditions, and which gave credence to the orientation of pragmatism in terms of epistemology to which the study ascribed from the beginning. The study therefore elicits a review of the pedagogy of graphic design, with constructivism becoming relevant in the teaching of ideation in graphic design education.

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DEDICATION

To my late sister, Philo, who eagerly awaited
my return home with this degree, but passed on
at the 11th hour of my study, and
to my lovely daughters.

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CHAPTER ONE

BACKGROUND TO THE STUDY

1. Introduction

Design education has been fundamentally changed by computers and new digital technologies. New ideas and new frontiers have emerged. Little remains of the studio practices prevalent just 25 years ago. Graphic design education has followed suit. Available literature shows that the online studio, as support for learning and teaching, was advocated a decade ago (Bennett, 2000; Kvan, 2001). Blended learning, involving both traditional face-to-face instruction and asynchronous and/or synchronous communication via the Internet, is now introduced or recommended (Bender & Vredevoogd, 2006:114). In response to the growing needs of ICT in design education, new courses are being designed (Bender 2005:4; Ranjan 2005:2), while collaborations on design projects are emerging because of virtual design studios (VDS). Literature discussing ICT in design is, however, mostly restricted to research in the study of architecture conducted in the developed world.

In developing economies, in the recent past, more attention has been paid to graphic design pedagogy as it particularly relates to using ICT in ideation. Ideation, which is the process of brainstorming with images, letters, figures and sketches, plays a critical role in developing design concepts. Traditionally, ideation is viewed as a paper-based activity. Literature that pertains to this issue comprises 1) a doctoral study by Yeoh (2002) on computer use on ideation by graphic design students, and 2) a study using a Virtual Reality Learning Environment technology (VRLE) in support of ideation by Thorsteinsson et al. (2010). Whereas Yeoh's (2002) study investigated the influence of computer technology on the design process of ideation among undergraduate graphic design students, Thorsteinsson et al. (2010) describe a specific VRLE established as a tool to facilitate ideation, and host online Innovation Education (IE) materials to stimulate innovation (Thorsteinsson et al. 2010:309). This ideation process studied, however, was not in graphic design but in innovation education—no mention made of design in any broad sense.

Yeoh's study was conducted in the US and indicates that computer technology develops new applications, thereby inspiring its users. It cites the computer as 'actual intelligence' that augments human problem solving (Yeoh, 2002:222).

Changes in educational skills and methods are now more important than ever, since developing countries have embraced ICT technologies to cope with challenges in teaching and learning. Pedagogically, graphic design education anywhere should consider ICT in ideation.

In his conclusion, Yeoh (2002:237) comments that technology is needed to make processes easier for graphic designers, and that at the same time graphic designers also need creativity to be different. They also need to excel, despite the content, context, and objectives of the problem they are trying to solve. It should, however, be pointed out that Yeoh's study was limited to computer use and failed to address pedagogic models used in the design process of ideation, especially in a developing economy.

This research focuses on current concepts of ideation in graphic design, as the design process advances into the digital domain. The context is that of a public university that is involved in graphic design with ICT, in a developing country. As previously indicated, attempts are being made by developing economies to integrate ICT in their education curricula. In a report submitted to the United Nations Development Programme (UNDP), Tinio (2003) mentions that one challenge facing developing countries today is making sense of globalisation and the information and communication revolution.

Concerns over educational relevance and quality coexist with the imperative of expanding educational opportunities to those made most vulnerable by globalization—developing countries in general; low-income groups, girls and women, and low-skilled workers in particular. Global changes also put pressure on all groups to constantly acquire and apply new skills [...] Information and communication technologies (ICTs) [...] have been touted as potentially powerful enabling tools for educational change and reform. When used appropriately, different ICTs are said to help expand access to education, strengthen the relevance of education to the increasingly digital workplace, and raise educational quality by, among others, helping make teaching and learning into an engaging, active process connected to real life. However, the experience of introducing different ICTs in the classroom and other educational settings all over the world over the past several decades suggests that

the full realization of the potential educational benefits of ICTs is not automatic. The effective integration of ICTs into the educational system is a complex, multifaceted process that involves not just technology [...] but also curriculum and pedagogy (Tinio, 2003:5).

1.1 Research problem

Researchers in design, namely in professional architecture and engineering, believe that ICTs enhance the teaching and learning of design (Wang, 2011). The adoption of ICT at the various stages of problem solving has not reflected in the teaching of graphic design, especially in idea development. This current study therefore seeks to investigate how ICT in graphic design education has affected the teaching and learning of ideation.

1.2 Aim and objectives of the research

The main aim of the study is to explore how ICT is used as a tool for the teaching and learning within the ideation process in graphic design in a developing country. Such exploration will include investigating pedagogies and paradigms that have informed graphic design education since the incorporation of ICT. It will also investigate how ICT integration in the pedagogy affects this complex, multifaceted process called education. This will also entail exploring how graphic design education is affected by ICT use, juxtaposed with long-held conventions esteemed in design education. The following sub-objectives will therefore help achieve the main objective:

- To interrogate how specific pedagogies influence ideation in graphic design education in this era of pervasive ICT use.
- To assess the use of ICTs in ideation in graphic design education in the context of large class numbers and to explore how applicable ICT in ideation is, in view of current design industry practices.
- To evaluate lecturers' and students' perceptions of ICT as it relates to the process of ideation in graphic design.
- To assess pedagogy that supports ICT in graphic design education, principally in the ideation process.

Owing to ICT and computer technology's now being part of the design process in graphic design pedagogy, this inductive analysis will allow for categories and patterns to emerge, and determine an improved integration that enhances graphic design pedagogy.

1.3 Rationale

The rationale for this research is twofold: practical and academic. The practical rationale: this research stems from personal experiences as a lecturer in teaching computer-related courses in graphic design. The academic rationale highlights the initial justification asserted, by consulting literature, developing a theoretical framework in the preliminary stages, and establishing conclusively, a defensible research viewpoint.

1.3.1 Practical rationale

Personally, my teaching experience shows that students, in coming up with their creative solutions during the design process, present at each deadline, between three and five *rough* sketches of ideas, together with the final comprehensive sketch. Pedagogy nowadays, returning to earlier conventions, requires that students work through and create as many thumbnail sketches as possible, discuss them with the educator, and decide on an option for the final concept to be used as the solution to the design problem. Background checks have revealed that students resort to using ICT facilities to generate their ideas, deliberately reducing the number of ideas they generate, thereby distorting the value of their final outcomes. Related discussions show students seem to be influenced by ICT in their creative thinking processes during ideation.

Zhang (2007) argues that the pedagogy of ICT in graphic design should not be one based only on the traditional models of design education, that is, a group-based, teacher-dominated, and centrally-organised pedagogical culture (Zhang, 2007:302). Rather, such pedagogy should be a strategy that poses significant, contextual and real-world situations. Pedagogy should also provide resources, guidance and instructions to learners as they develop content knowledge and problem-solving skills (Mayo et al., 1995:134).

With the increase in class size, there seems to be a disconnect between students and lecturers, especially with ideation as part of the problem-solving process in graphic design. Initial observations of the ideation process disclose the following:

- A high percentage of students show keen interest in using ICT facilities and the computer in studying graphic design.
- ICT tools, such as the Internet and computer technologies, together with various design software like the Adobe Suite (Photoshop, Illustrator, In-

Design, etc.) have become critical and indispensable to the studies and skills acquisition of graphic design students.

- In design education, more access to ICT tools means better access to instructional and inspirational material.
- There seems to be a high level of collaboration and much intense, self-organised learning among graphic design students brought on by new features on computers and upgrades in ICT infrastructure.
- Once the right environment is created, minimal but appropriate supervision and interventions are required in promoting computer literacy in graphic design, since much learning appears to come largely from the interactions of students.

One major question is, with all these, what happens in ideation when graphic design students, for graphic design problems, begin to initiate solutions? Where does the fascination with and motivation to use ICTs in graphic design come from? Are graphic design educators taking advantage of the introduction of ICT to reshape the pedagogy in graphic design education? Answers to these and many more may be found when researchers begin to explore how ICT is transforming graphic design education.

The teaching of ideation can be redefined without sacrificing the fundamental objectives of graphic design education, with the adoption of an appropriate pedagogy, and with ICT as mediation. Introduction of ICT elicits an effective link between purpose, learners and pedagogy inside the institution, and should enhance creativity in graphic design (Stensaker et al., 2007:431). The introduction of ICT also means that research into the educational use of ICT for improving pedagogy, identity and electronic learning portfolios (e-portfolios) will have to be increased; consequently, more research should be directed at ICT and the ideation process.

1.3.2 Academic rationale

Bender (2005:2), in her analysis of effective studio work, identified four conditions for effective studio work in the design process as they relate to design education. Schon and Kvan—*Schon and the Traditional Studio Today* and *Kvan's Theories on Effective Online Studios* in Broadfoot and Bennett (1991:8-10) corroborated these conditions. They are *Learning by Doing*, *One-to-One Dialogue*, *a Collaborative* and *Process-Focus*. These conditions set critical pillars in the pedagogy of design

education. In the condition of *process-focus*, which proposes less emphasis on the final evaluation of the outcome of design concepts, students need to be taken through a critical review of design processes that will lead to knowledge based not only on ideological considerations (Dutton, 1987:18). The condition of process-focus also encourages students to explore imagination, document ideas and see how concepts are properly built (Dale, 2006:3). This methodology forms the basic process of the ideation process in the evolution of creative design, and should be, as methodology, the focal point of any design pedagogy. The emergence of digital studios has also shifted the design process into the digital domain, highlighting the concept of *process-focus*. This is one of the critical pillars of design education. It is, however, being sidestepped—at least in the traditional sense.

Research indicates that with the introduction of ICT and computer technology, students focus no more on the vigorous conventional sketching and rapid visualisation used in idea development (Tang et al. 2011; Stones & Cassidy 2010). The situation has become worrisome particularly following the ingress of ICT. Design educators are still searching to restrict students to the pedagogy of the Bauhaus-inspired studio formalism. Despite that, researchers still agree that conventional sketching methods remain essential in ideation (Garner, 2001; Bilda et al, 2006; Schenk 2007).

Bender (2005:8) again postulates that, as technology becomes more transparent in the learning process and offerings of online courses continue to rise, knowing how technology affects teaching and learning is imperative for educators. Consequently, for this study, to ascertain the merit of reforming pedagogy to optimise adopted technology, the focus will be on the integration of ICT in the design process: specifically, on the process of ideation.

Yeoh (2002:237) remarks in the conclusion of his study, that technology is needed to make things easier for us but at the same time we need creativity to be different and to excel, despite the content, context, and objectives of the problem we are trying to solve. What Yeoh (2002) seems to suggest is that in our desire as educators to teach, as priority, the principles that shape the creative abilities of students, technology should not be discounted.

To be sure, graphic design is viewed by students as a professional course.

Students' minds therefore are always tuned to what pertains in the profession, and how they might one day impress clients. Wallis et al. (2010) share this view when they remark that 'it is important to acknowledge that the processes of designing and how to teach design are largely based on the profession's tacit knowledge and experiences' (Wallis et al., 2010:1). It is also important to remind ourselves as educators, that the nature of graphic design requires graphic design work always to be time bound, and therefore we find the quickest, most creative, cost-effective way of meeting the communication needs of clients.

One hypothesis that drives this research is that students will sidestep and distort the normal design process of ideation, if an intense educator/learner interaction in ICT-based studio activity is not portentously looming. This hypothesis will be explored, together with other hypotheses to find answers to how the introduction of ICT in ideation has altered behaviour towards design processes in the studio/classroom.

1.4 Research question and hypotheses

1.4.1 Research questions

There is evidence that suggests that while traditional pedagogy dating back to L'Ecoles des Beaux Arts, and the Bauhaus are still, in developing countries, largely prevalent in graphic design education (Ranjan 2005), ICT contributes to innovations in design pedagogy. It is against this background that the research poses two main questions:

- What happens to the teaching and learning of ideation in graphic design when students begin to use ICT in direct contrast to traditional graphic design pedagogy?
- How do the ICT methods affect the pedagogy of graphic design in a developing economy?

These main questions also lead to further sub-questions:

- How do graphic design students and educators perceive ICT in the pedagogy of ideation in graphic design?
- What informs the use of ICT by graphic design students in their ideation process?
- How does the introduction of ICT affect the teaching and learning of the ideation process in graphic design, especially in the modern studio?

1.4.2 Hypotheses

To be able to answer these questions successfully and in connection with the stated aims and objectives, the following hypotheses were proposed:

1. Students will sidestep and distort the process of ideation as long as intense educator/student interaction in ICT and in studio work is not assured.
2. ICT in graphic design education can create a synergy between educators/students through technology.
3. The teaching and learning of graphic design, especially in the process of ideation, will become more effective and the understanding by design students of visual communication will develop and expand through using ICT.

These hypotheses were mapped against sub-questions that will help interrogate the main research question. Table 1.1 indicates the matrix of the hypotheses against the questions.

These hypotheses are based on the assumptions that if students are not encouraged to go through ideation, especially with technological tools, they will be forced to chart their own path of design creation. This may tend to reduce their creative outcomes, as far as the objectives of graphic design education are concerned. This assumption of reduction in the level of creativity is, however, delineated in this study.

Table 1.1: Matrix of hypotheses and research questions

Hypotheses		Research questions	
1	Students will show some attitude of sidestepping and will distort the process of ideation as long as educator/learner interaction in ICT and studio activity is not guaranteed.	1. 1	How do graphic design students and educators perceive ICT in the pedagogy for ideation in graphic design?
		1. 2	What informs the use of ICT by graphic design students in their ideation processes?
		1. 3	How does the introduction of ICT affect the teaching and learning process of ideation, especially in the modern studio?
2	ICT in graphic design education has the potential of creating a synergy between educators/students and the potentiality of technology	2. 1	How do graphic design students and educators perceive ICT in the pedagogy for ideation in graphic design?
		2. 2	What informs the use of ICT by graphic design students in their ideation process?
3	Teaching and learning of graphic design will become more effective and the visual understanding of design students may develop and	3. 1	How do graphic design students and educators perceive ICT in the pedagogy for ideation in graphic design?
		3. 2	How do the features of ideation relate to graphic design with ICT?

	extend by using ICT, especially in the process of ideation.	3. 3	How does the introduction of ICT affect the teaching and learning process of ideation, especially in the modern studio?
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1.5 Background to the study

The context of this research is the Department of Communication Design, Kwame Nkrumah University of Science and Technology (KNUST) in Ghana. The Department of Communication Design, formerly the Department of Design and General Art Studies (DGAS), was established in the College of Art in October 1972. It comprised three sections: the Foundation or Pre-Degree section, the Art History Section and the Graphic Design section. With time, the Pre-Degree section was scrapped with some modules merging with the curriculum of the Graphic Design section. Now known as the Department of Communication Design, the Graphic Design section underwent several changes before developing into a department. Even though the programme has been renamed Communication Design, the content and philosophy remain that of graphic design. Courses taught include Graphic Design, Advertising, Illustration, Photography, Video Production, Animation, Computer Graphics and Graphic Design Production. These courses are basically directed towards preparing students for the graphic design industry.

The programme was designed with the influence of Bauhaus education principles—principles which have been persistently adhered to albeit with minor revisions. It is a four-year degree programme that leads to the award of a Bachelor of Arts (BA) Communication Design degree. As the only programme of its kind in Ghana, it has been effectively rationalised to correspond with international standards, and aims to cater for the demands of a growing advertising and printing industry in Ghana. As the only institution providing such a programme, the university receives applications from all over Ghana and from other English-speaking parts of the West African sub-region. University authorities face challenges of managing applicants seeking admission. Infrastructure nonetheless, has not expanded to meet the needs of the increasing number of students.

Owing to lack of space, a studio which originally accommodated 25 students now houses a class of 130 students. This overcrowding makes it impossible for proper student-lecturer interaction as is required by traditional graphic design pedagogy. Dividing the classes into two equal groups of 65 each, has not helped in managing the pedagogy. The problem is further compounded with the introduction of ICT, which enables students to go through ideation with little or no interaction with

lecturers (against the Bauhaus concept of desk-critique sessions that dominate in the pedagogy). Students have become more proficient in ICT use, and computers (PCs, laptops and tablets) are ubiquitous among students (Stones & Cassidy, 2010). The perception, and the consequent assertion that graphic design students 'circumvent' the principles of design when ideating, will be fully interrogated and interpreted when the study examines the intentions of students, the tools or ICT models they use, and what emanates from their design activities—in the light of the conventions practised in ideation.

Design should be seen as an activity or process that explores the best way of communicating an idea, product or image. Next, it must facilitate the creation of appropriate conditions, artefacts and environments to solve a particular problem. Literature supports the view that graphic design consists of complex decision making in idea development, which helps solve design problems (Dorst & Cross, 2001; Dorst, 2006). Next, according to Hasirci and Demirkan (2007), graphic design uses mental imagery, systems and environmental ideas to add value to reach the desired result (Stones & Cassidy, 2007). In terms of ideation with ICT, with activity theory as the lens, exploring why students are doing what they are doing today, will give a broader understanding of where design education is heading. Educators will thus be able to review the pedagogy of ideation with ICT in graphic design education.

1.6 Research design

This research study investigates *what* happens in ideation with ICT and *how* it happens. Following this intention, the study is based on an interpretivistic ontological orientation. Epistemologically, it is pragmatist in its orientation, and therefore adopts both a qualitative and quantitative research strategy. Transformation and emancipation within the phenomena being explored, however, positions this research study philosophically in a critical paradigm. It is about how the graphic design students transform their ideation process with ICT and how emancipatory or otherwise such actions are to pedagogy (Babbie & Mouton, 2001:14).

The study adopts a 'multi-method' approach (Denscombe, 2007), also called mixed research (Onwuegbuzie & Johnson, 2006), to pragmatically take advantage of both similarities and differences in qualitative and quantitative methods (Yin, 2011:289). Even though the quantitative method differs from qualitative research in how both

append knowledge and address questions raised, they can both be applied to one and the same research problem (Ivankova et al., 2007:261). According to Ivankova et al. (2007), 'by using a quantitative approach we look for relationships between the variables, while by using a qualitative approach we seek in-depth understanding of individuals' experiences'.

By adopting the multi-method approach, I sought to capture both quantitative and qualitative approaches in a pragmatism paradigm. That meant surveying ICT methods and the players involved in graphic design education, and documenting the everyday experiences of students (and educators) in the lecture rooms to obtain a more holistic impression of teaching and learning rather than just answers to the research questions. In addition, documenting the analysis of designs and sketches produced by learners is presented. The purpose was to know more than just 'to what extent' or 'how well' (Fraenkel & Wallen, 2003), which meant applying both primary and secondary data to the study, with questionnaires and personal observation of the research. The research also included personal interviews via a case study. According to Yin (2009), such a case study synthesis can be performed as a predesigned part of one study, where the technique treats each case as one but not a replication. The study also focuses on purposive but non-probability sampling methods of students and the courses as stratified random.

The study was positioned within the framework of activity theory (Engeström, 1999b) as the basis for understanding context-based investigations of individual and group mediated actions. Additionally, however, it focuses more on an interpretivist framework as anticipated in the creative process of graphic design education with ICT. Figure 1.1 is the overall research design followed by the matrix of sub-questions against the instruments of the research captured in Table 1.2.

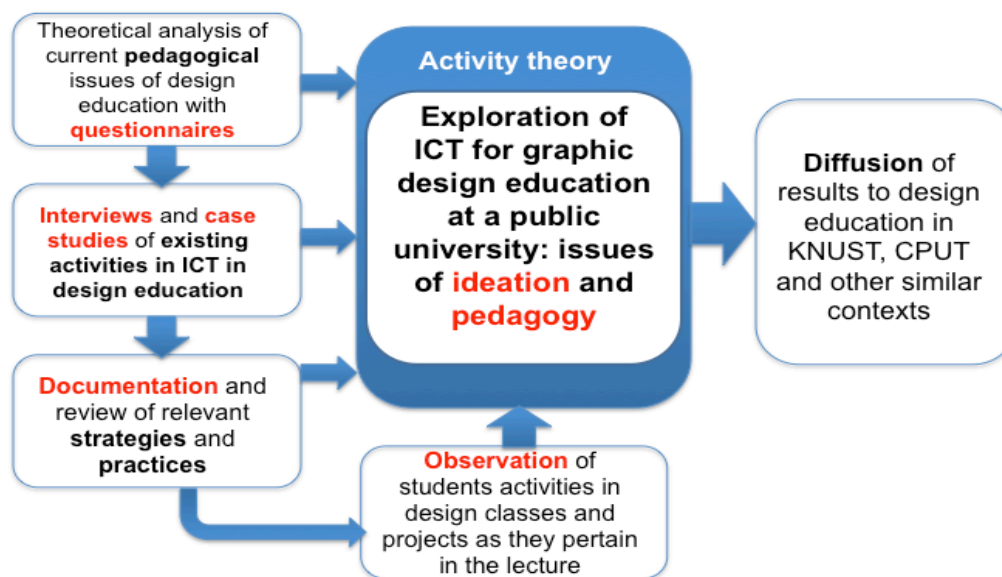


Figure 1.1: The overall research design (after Korpela, 2003)

Table 1.2: Matrix of the research problem against instruments

	Research sub-question	Interview	Observation	Documentation	Questionnaire
1.1	What are the features of graphic design with ICT?	X	X	X	
1.2	How do the features of ideation relate to graphic design with ICT?	X	X		X
1.3	What are the perceptions of ICT by design educators and students in the current design learning and pedagogy?	X	X	X	X
1.4	What are the purposes of ICT in the modern studio and how do they feature in the ideation process?	X	X	X	

1.6.1 Significance of the research

Design is increasingly becoming a growing academic field (Koskinen et al., 2011) and there are indications that design education is also gaining grounds, in universities in sub-Saharan Africa. Design institutions are under pressure to build capacity for the large number of learners trying to acquire graphic design education. With limited facilities, it behoves such institutions to investigate not only a blended learning approach but also online education and possibly distance education.

Improving design education may imply not just adopting the Bauhaus theory (Franciscono, 1971; Wallis et al., 2010), but contextualising it with local culture and the results of research in graphic design education.

My study explores the undefined role of ICT in the design process of ideation. This exploration assists with the appropriate, effective use of the potential benefits of ICT for graphic design education in particular, and design education in general. It may also facilitate and increase understanding of visual communication, and enhance the creative thinking of graphic design students. The current complexity of online design education for large numbers seeking to pursue graphic design education might be made easier and more feasible.

The results of this research can be adopted in a pedagogical framework that could be readily adapted by similar institutions on the continent and further afield, where challenges and design for development can be targeted 'in the most effective ways' (Margolin, 2007:115). Such strategies would promote collaboration and support peer-review mechanisms among graphic design educators within the continent and across the globe.

1.7 Structure of the thesis

This study starts with the description of the background of the study, its objective, rationale and purpose. Literature is used to justify the need for this research as an academic quest. The research study is elaborated upon with hypotheses and sub-questions that provide the basis for interrogations, and ends with the design for this research.

The remaining chapters are captured as follows:

Chapter 2 contains the review of related literature and documents based on the theoretical framework of activity theory, which sets the foundation for this research. The initial discussions look at activity theory as it relates to the study, examining ideation as a unit of analysis to subsequent discussions. This is followed by probing the Bauhaus pedagogy, design studio activities and design principles within Graphic Design Education. The study later discusses the educational paradigms within the last decade that call for a shift in teaching behaviour. Thirdly, I shall focus on the pedagogy of ICT as it affects and relates to the design process of ideation and how educators influence or otherwise, the design process of ideation using ICT.

Chapter 3 deals with the frameworks that drive the research, looking at a framework for graphic design and technology-based design education, and focusing on activity theory as a lens for this current research.

Chapter 4 captures the research design and methodology. It discusses research philosophy, design and methods, and outlines the plan adopted to explore the issues happening within the design process of ideation as they move into the digital domain. The design rationale of multi-method strategy, which includes quantitative and qualitative approaches are discussed, together with issues of validity and reliability. Methods and tools, together with the population sample of data collection, are explained. Finally, the method of analysis and ethical considerations are captured for the successful implementation of the study.

Chapter 5 describes and analyses the responses to the quantitative aspects of the study with the questionnaire. This consists of sections that require finding answers to the questions captured within the hypotheses, which are:

- What are the features of graphic design with ICT?
- How do the features of ideation relate to graphic design with ICT?
- What are the perceptions of ICT by design students in the current design learning and pedagogy?
- What are the purposes of ICT in the modern studio and how do they feature in the ideation process?

Discussions on such findings will be used to analyse the hypotheses captured in this study:

- Students will show some attitude of sidestepping and will distort the process of ideation as long as educator/learner interaction in ICT and studio activity is not guaranteed.
- ICT in graphic design education has the potential to create a synergy between educators/students and the potentiality of technology.
- The teaching and learning of graphic design will become more effective and the understanding of visual communication by design students will develop and extend through using ICT—especially in the process of ideation.

Chapter 6 describes and analyses responses to the qualitative aspects of the study that was conducted through observation, administering questionnaires and

organising interviews. This chapter also consists of sections that answer questions captured within the hypotheses, specifically:

- What are the features of graphic design with ICT?
- How do the features of ideation relate to graphic design with ICT?

Chapter 7, which is the concluding chapter, gives a summary of the study. It opens with highlights from various chapters and their implications for the whole study. It also highlights some methodological reflections—justifying the methodology and framework for the study; implications of the study as answers to the research questions, as well as scientific and substantive reflections on the framework. Finally some recommendations for this study are given.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

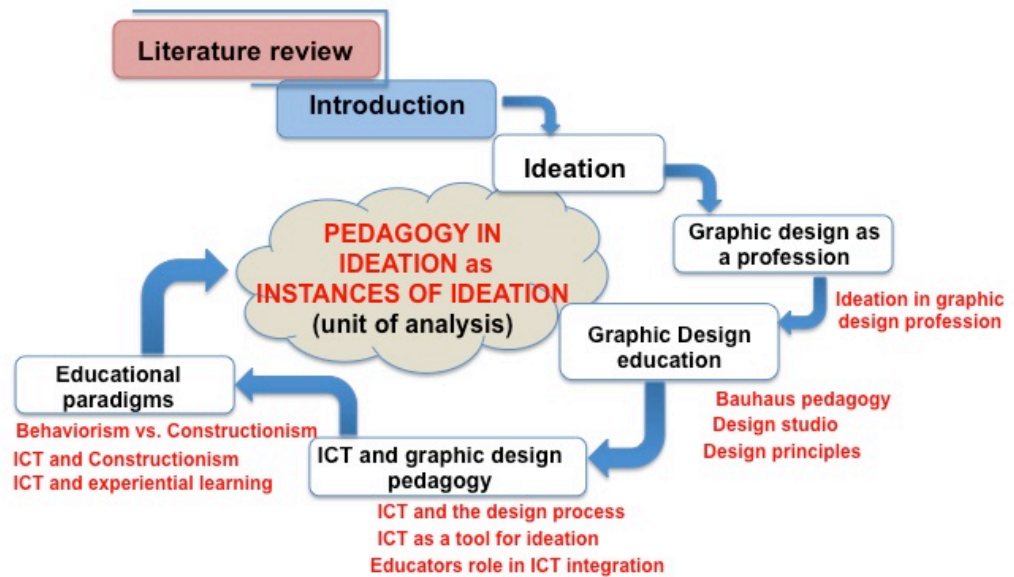


Figure 2.1: Diagram showing the structure of the review

2.0 Introduction

In this chapter, while interrogating graphic design education, I examine current developments in the design process, using ICT to ideate. The objective is to lay the foundation for the two major research questions:

- What happens to the teaching and learning of ideation in graphic design when students begin to use ICT in direct contrast to traditional graphic design pedagogy?
- How do the ICT methods affect the pedagogy of graphic design in a developing economy?

That will mean exploring ideation, graphic design as a profession, graphic design education, how ICT is mapping out in graphic design, and finally, what educational paradigms have informed graphic design education in the era of ICT. I also examine the imbalances in pedagogical paradigms that have absorbed graphic design education since the introduction of ICT. I conclude this section by identifying an appropriate framework that will support ICT in graphic design education.

In considering the questions:

- ‘What happens to the teaching and learning of ideation in graphic design when students begin to use ICT in direct contrast to traditional graphic design pedagogy?’
- ‘How do the ICT methods affect the pedagogy of graphic design in a developing economy?’

four major themes were captured which inform the basis of this discussion. These are graphic design as a profession, graphic design education, ICT in the graphic design pedagogy, and educational paradigms that have engaged graphic design in the last decade.

The pedagogy of ideation is about the teaching and learning of how to gather ideas in the design process. Fundamentally, it is about the approach of conceptualising ideas to solve the design problem with the use of the traditional method of paper, pencil or any material that will generate the formation of ideas. Graphic design as a profession is informed by the pedagogy of ideation. Much of the history of graphic design is situated within the philosophy and drawing ‘upon the internationalism of Bauhaus-inspired formalism’ (Sullivan 2010). One principle entails educators’ following every step of ideation by students while students solve design problems. The review is used to discuss the current pedagogical model of the ideation process that drives graphic design education; next, it interrogates how current practices in both the profession and education create disturbances and imbalances in ideation pedagogy.

With the introduction of ICT into the pedagogy of graphic design, especially in developing countries, certain questions need answering. Do current models and paradigms really align with educational practices in graphic design, especially with the introduction of ICT? What are the perceptions of ICT by design students and educators in current design pedagogy? What are the current features of graphic design regarding ICT in ideation, and how do these features of ideation speak about ICT use in graphic design? In situations where ICT has encouraged virtual design studios (Kvan, 2001; Reffat, 2002), what are the purposes of ICT in the modern studio and how do they particularly feature in the ideation process? The searchlight of the study therefore is on ideation as a unit of analysis and ideation activity will be highlighted within the framework of Activity Theory.

Using ideation and related topics in graphic design as keywords, the researcher identified numerous authors that have worked on issues relating to these topics previously indicated. Much investigation was done in *Design Studies* and *Design Issues*, two reputable journals for design practice and related issues. These formed the basis for obtaining the data and identifying lacunae on issues concerning ideation relating to design practices in general and graphic design in particular. Significantly, none of these studies reported on ideation that relates to the pedagogy of graphic design in a developing country. I therefore proceed by looking at ideation in the design process, as an introduction to major themes to be discussed later.

2.1 Ideation

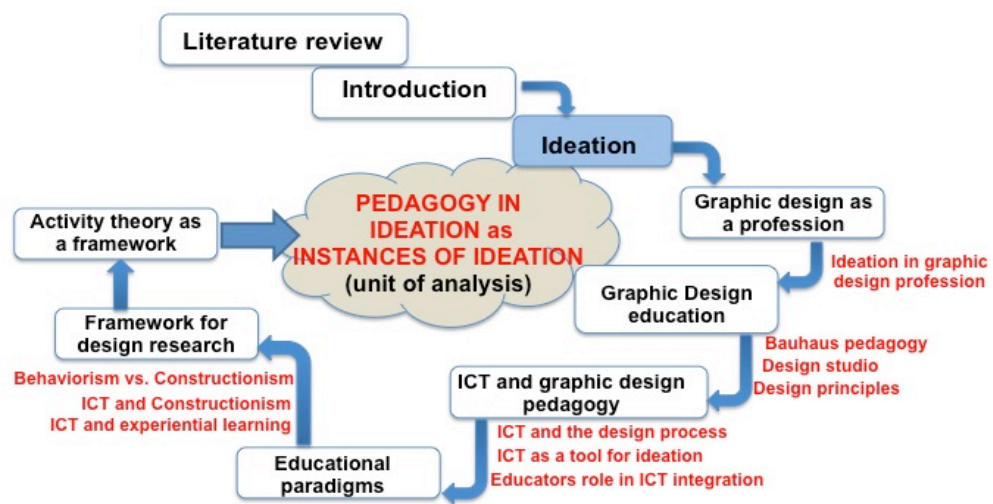


Figure 2.2: Diagrammatic approach to the review

Ideation is 'seen as a matter of generating, developing and communicating ideas, where "idea" is understood as a basic element of thought that can be either visual, concrete or abstract' (Jonson, 2005:613); it is, in other words, a sense-making activity that helps us knock around our half-formed ideas in the search for greater sense that shapes our design solution (Kimbell, 2004:137). Next, it is an ability to conceive a plan for a particular purpose or effect (Yeoh, 2002:71) and 'the process of generating, developing, and testing ideas that may lead to solutions' (Brown, 2008:4). Ideation involves the mind acting in consonance with the environment or using creative thinking tools which, in design, sometimes involves the sub-conscious. Within the ideation process, therefore, one engages primarily with the mind, and derivatively with creative thinking tools for brainstorming, organising,

sketching, drawing, when thinking and imagining with the view to creating ideas for implementation (Kimbell, 2004). This process is best described metaphorically as a system of spaces rather than a predefined series of orderly steps (Brown, 2008:4). In his three-phase design-thinking model, Brown (2008) put ideation in between 'inspiration' and 'implementation' loops, and believes that the process loops back more than once as ideas are refined and new directions taken (Brown, 2008:4), a process depicted in Figure 2.3.

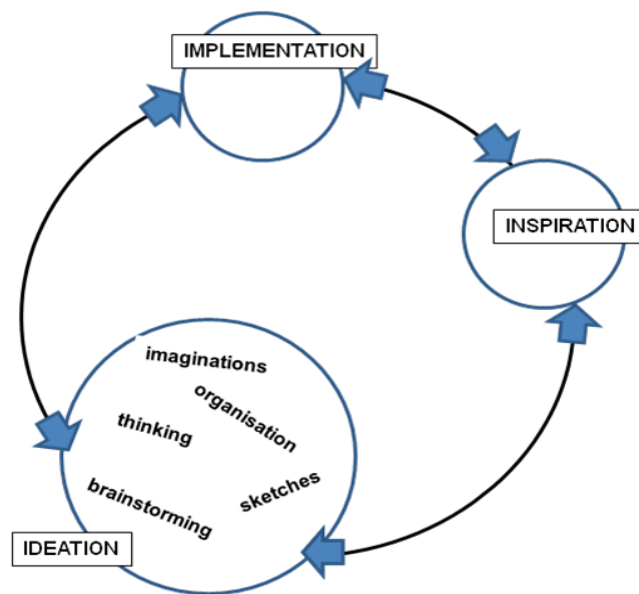


Figure 2.3: A three-phase design-thinking model for design process (Brown, 2008)

Design processes adopted for creative work in design are derived from the 'ideation' models (Cross, 1997; Dorst & Cross, 2001). According to Dorst and Cross (2001:426), creative thinking tools such as brainstorming enable one to have a vast number of ideas to choose from. Designers have to undergo these brainstorming activities to get the creative work by doing thumbnail sketches and some preliminary drawings, also referred to as idea development. Dorst and Cross are of the view that creative design involves a period of exploration in which problem and solution spaces are evolving and are unstable until (temporarily) fixed by 'an emergent bridge', which identifies a problem-solution (Dorst & Cross, 2001:435). Such a period of exploration is captured by a series of sketches or drawings that one can follow sequentially. It is also the in culmination of these sketches that concepts of

ideas are created to solve design problems.

Even though my study does not focus on drawing in particular, drawing itself forms an integral part of the ideation process. Traditionally, both individual designers and big design consultancies extensively used paper-based drawings throughout the visualisation or idea-development process (Schenk, 2005). Drawing captures ideas visually during brainstorming, and serves as a vehicle for creative interchange in group sessions whereby designers share and stimulate ideas in one another while brainstorming and ideating (Schenk, 1991). Drawing is therefore a brainstorming tool that designers use in arriving at a solution to a design problem. This also develops their visual literacy and fund of 'stored analogy' to support their creative behaviour in the ideation process (Schenk, 1991:181).

Technology has currently permeated every facet of graphic design — in its teaching and learning as well as in professional practice. It is now almost impossible to talk about graphic design without the mention of technology, from idea development to the final execution of a design solution. Some of these technologies include computers and software that enable designers to create, develop and refine concepts in the ideation process. Educators, having realised more than two decades ago the influence and indispensability of computer technology, started equipping institutions with technology to meet industrial demands and standards (Papert, 1987). Anecdotal evidence suggests that almost all institutions training graphic designers support their teaching and learning with information and communication technology. The introduction of technology into graphic design education has also brought pedagogical challenges, as it requires relearning, training and upgrading (Yeoh, 2002:3).

These challenges seem to be pronounced when it comes to the issue of ideation or idea development. Influences of technology are creating new possibilities for students to conceive ideas differently from the traditional methods of drawing and sketching. In the wake of these developments, therefore:

- How do graphic design students and educators perceive ICT in the pedagogy of ideation in graphic design?
- What informs the use of ICT by graphic design students in their ideation process?
- How does the introduction of ICT affect the teaching and learning of the

ideation process in graphic design, especially in the modern studio?

Understanding the phenomena that engage students and educators in the use of information and communication technology within the process of ideation in graphic design will help frame an appropriate pedagogy for graphic design with ICT. Before then, educators will need to remind themselves that the graphic design profession does inform the pedagogy of graphic design education indirectly.

2.2 Graphic Design as a profession

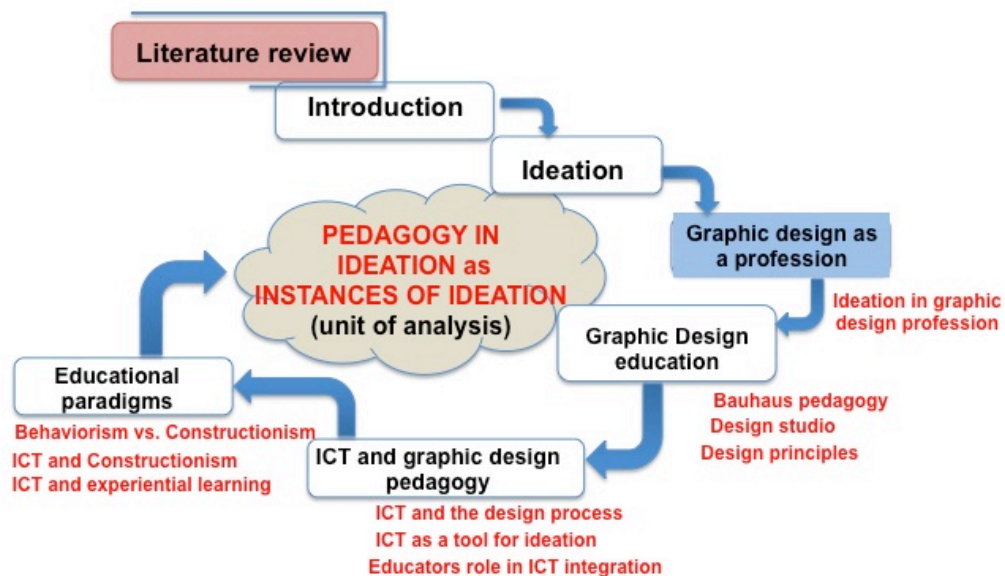


Figure 2.4: Diagrammatic approach of the review, showing graphic design a as profession

Quoting from the American Institute of Graphic Arts—an authoritative body for the graphic design profession—Yeoh (2002:7) describes graphic design as ‘the profession that plans and executes the design of visual communication according to the needs of audiences and in the context for which communication is intended’. The success of such visual communication is also about persuasion and advertising in addition to the appeal of visual creativity (Batta, 2009:3). It is about translating ideas and concepts into a visual form by the thoughtful application of colour, layout, arrangement, imagery, and typography

A few years back, the term graphic design was linked to posters, billboards and printing only. Currently, graphic designers often work across a variety of disciplines and media. The scope of the profession in itself has been broadened, and is now used to describe a series of broad-based fields of activity, encompassing design for print, advertising, moving graphics for film and television, all manner of visual communication and all manner of visual communication and design (Mcquiston, 1993). Meggs and Purvis (2012) also believe that the current graphic design field is much broader than in the past and now includes disciplines such as motion graphics, environmental commodities, and new media.

The outcomes of the profession have also changed and are seen as commodities as well as businesses to create products. The nature of the profession today, in its fast-paced transformation, is such that one needs to always 'invent' some avenue to meet emerging challenges. According to Kowaltowski et al. (2010),

Recent job market trends and the globalisation of the design profession call for educational enhancement. Higher design quality from design professionals is expected as well. The contemporary world, with its dynamic production of knowledge and speed in technological advances, as well as obsolescence, demands professionals capable of keeping up with this pace. The new order also implies that design students need a deeper understanding of background knowledge and need to acquire new abilities and attitudes towards design, with an increased demand on creativity. Producing designs that are fresh and new to the problem domain are expected of our students and of design professionals as a whole (Kowaltowski et al., 2010:454).

New abilities will require that graphic design students obtain the requisite skills and knowledge that will make them more competitive in the job market. In coping with such demands and challenges therefore, students are doing everything possible to become competitive in the job market. This includes learning and using available technology and software that will give them the leading edge in developing ideas for the design process—hence the indispensability of ICT in graphic design, both in the profession and in its study, especially at the higher educational levels.

technology have revolutionised the graphic design profession. They see the computer as augmenting the pace at which graphic design problems can be solved and permitting designers to work more resourcefully. The profession is no longer limited to books, posters and advertisements, but now includes motions graphics, interactive media, and more (Meggs & Purvis, 2012:iv). Such a revolution implies training the right people with the right skills to perform in such a technological market. The profession now requires designers who can apply the right methodologies to solve current design problems that include motions graphics and interactive media.

When recruiting designers in their professional studios, there is always the tendency for managers to recruit individuals who are professionally capable in keeping up the pace and can fit into the studio activities within the shortest possible time, as managers may not have the luxury of long term re-training. The situation mirrors the tendency of design institutions to move towards professional rather than general education at colleges and universities (Swanson, 1998). Design educators are therefore conscious of tailoring their courses to match the real-world situations in the profession. Many design institutions have also increased the technological content in their curricula, while investing in the acquisition of computing resources to ensure that they provide their students with the necessary skills and competitive advantage (Reffat, 2008) when they complete their education and seek employment.

Meggs and Purvis (2012) believe that technological involvement in the profession, however, does not release the profession from its historical ties. There are still some distinct ties binding the profession to past crafts and historical foundations that have some essential place in current graphic design education. Historically, graphic design has evolved from primitive visual communication, which includes abstract geometric signs of dots, squares and other shapes that intermingle with animal drawings. Aside from the use of dots, shapes and abstract images, there is the issue of following the idea development steps in arriving at design solutions. The graphic design renaissance, technological advancement and digitisation have all contributed to the ever-changing face of the current graphic design profession as taught in the universities. The profession somehow dictates the graphic design education. Experience of the design profession is emphasised in teaching, to let the student identify the needs and related problems required in the profession. According to Ho (2010), these are emphasised in part of the design teaching to prepare students for

working in the industry. To these effects the digitisation of the profession can somehow influence the pedagogy of graphic design, especially in respect of the issue of ideation. This issue of influence and the era of digitisation in the graphic design profession prompt us to ask:

- What happens to the teaching and learning of ideation in graphic design when students begin to use ICT in direct contrast to traditional graphic design pedagogy?
- How do the ICT methods affect the pedagogy of graphic design in a developing economy?

2.2.1 Ideation in the graphic design profession

In the graphic design profession, ideation is one of the paramount processes and techniques that designers use to express their ideas at the outset of design tasks. Jonson (2004) believes that 'sketching about for ideas is a sense-making activity that is not so much about mastering techniques (surface structure) ... but rather signifies the underlying relationship between designers and conceptual tools' (Jonson, 2004:282). In his thesis, he indicates a range of possibilities designers *use to express their ideas at the outset of design tasks*. These include the incidence of sketching (i.e. pencil or pen conceptual jottings of a pictorial kind) and the incidence of word use (i.e. through discussion or in written notes). From his observation and interviews, the most critical mode of expression in ideation is through words as a key tool. He therefore challenges the strength of the primacy of sketching as a dominant feature in ideation, since ideation is essentially an interaction or dialogue between visualisation (non-verbal) and language (verbal).

Kimbell (2004), commenting on this visualisation, exhorts researchers not to consider the tools but rather their use in ideation.

Visualization is the surface structure of ideas ... whereas the meaning of ideas is embedded in the deep structure of language ... Arguably then, what matters is not what tools are used (i.e. surface structure) but why they are used (deep structure) ... because the deep structures signify how tool usage is rooted in meaning (Kimbell, 2004:137).

One is therefore inclined to believe that, when it comes to ideation in the profession, the focus is more on how to achieve the outcome, rather than on the tools by which the outcome is achieved. These include series of sketches that are captured in the

ideation process.

Johnson (2005) also, discussing sketching in ideation in his subsequent paper: 'Design ideation: the conceptual sketch in the digital age', explains that the relatively small amount of traditional sketching among the students who participated in his research, had more to do with constraints in the design environment than any personal rejection of freehand drawing (Jonson, 2005:621).

His argument is that designers cannot do away with sketching altogether in the ideation process, especially in the era of ICT. This notwithstanding, the changing environment in the graphic design profession makes practitioners resort to innovative means to solve their ideation problems rather than resorting to traditional drawing, even though they support the use of drawing as a skill. One of the innovative means adopted by graphic design practitioners as recorded in his study is the use of computer technology.

The use of the computer for conceptualizing did not, however, side line the drawing issue. The practitioners considered sketching a skill too and backed the teaching of drawing despite the fact that they themselves did relatively little sketching in their everyday practice. The reasons given for this were mainly commercial, for example, time and cost pressures, but also client expectation of photo-realistic images at the ideation stage (Jonson, 2005:621).

According to Jonson (2005), the majority of practitioners and students in design use computing as a conceptual tool, especially with software such as Adobe Photoshop and Adobe Illustrator. So how do design educators factor this aspect into the curricula of ideation in graphic design education?

As stated earlier by Jonson (2005), in the graphic design profession, not much attention is placed on what tool will help solve the design problem, but rather the focus is on how the solution is realised. At the end of production, the satisfaction of the client is paramount. On the contrary, in graphic design education, the teaching of ideation seems to focus more on the traditional tools, hence educators' insistence on learners' avoiding computer technology for idea development.

One major focus of the design professional is how to be more resourceful, and meet the challenges and demands of clients and the industry. Since the computer has augmented the pace at which graphic design problems can be solved, more attention will be on designers who can help in developing such ideas with technology in the studios for clients quickly and effectively.

In 'an activity theory-focused case study of graphic designers' tool-mediated activities during the conceptual design phase', Tan and Melles (2010) discuss how 'mid-weight' professional graphic designers are able to reach their goals with ICT tools in their ideation process. Such tools include software tools like Illustrator, Acrobat and InDesign (Tan & Melles, 2010:472). In their study, even though initial conceptualisation of these designers was captured on paper, verbalisation and computer technology absorbed much of the designers' attention as far as the ideation processes were concerned. The designers started with a basic strategic direction, but soon changed the direction of their activities undertaken during idea generation, which did not reflect linear implementation of a particular strategy. Instead, their activities were seen to be dynamic, iterative, and opportunistic. They used those tools that allowed them to complete the task in the most efficient fashion and also to reduce runtime (Tan & Melles, 2010:472).

Even though graphic designers may have learned the basic strategies for creating solutions to their design problems, they tend to undertake activities that seem to be unconventional with idea generation and also do not reflect linear implementation of a particular strategy. They tend to be dynamic, iterative, and opportunistic, and appear to create short-term objectives to support the design process (Tan & Melles, 2010:472). The unconventional nature of the tools and system might not be a deliberate effort to avoid the ideation process; rather, technology has permeated the profession and is aiding designers to perform better and more efficiently.

Computer technology has become one of the tools of ideation in graphic design: both a 'thinking tool' and a 'conceptual tool' (Jonson, 2005). Graphic design has evolved from the 'primitive' abstract geometric shapes to include a spectrum of ideas for film and TV, and all manner of visual communication and design. Currently, graphic design comprises not only artefacts, but includes disciplines such as motion graphics and environmental commodities. It also involves understanding human engagement in an effort to produce useful and pleasing artefacts. The introduction

of ICT, and specifically computer technology, has also developed a new approach for designers in tackling the ramifications that have arisen from using technology, especially in the process of idea development.

The literature asserts that the graphic design profession is informed by technology in ideation. Professional graphic designers and student designers will and do rely heavily upon tools and techniques to make sense of their ideation within their respective design tasks. Issues that inform the pedagogy of ideation, since technology has changed the practices of graphic design profession, especially the education of designers, should be cause for concern. The features of ideation in graphic design education, being the requisite software application—be it drawing or sketching by technology—require that educators and researchers need to be proactive and deliberate in setting up discussions and interactions that support and enrich ideation among students and between students and teachers as far as ICT and graphic design pedagogy is concerned (Kimbell, 2004). Anything otherwise will not stop students from distorting the process of ideation, but will rather chart a course that will seem to match what is happening in the profession, since digitisation has now been seen to prevail in the profession. This highlights one of the hypotheses of this study, that ‘students will sidestep and distort the process of ideation as long as intense educator/student interaction in ICT and in studio work is not assured’.

Learning in the digital age requires an adoption of a review of activities and pedagogies for today’s graphic design challenges, within the current context, where there seems not to be pedagogy for graphic design with ICT. More so where ICT is impacting on ideation in the design process:

- How do graphic design students and educators perceive ICT in the pedagogy of ideation in graphic design?
- What informs the use of ICT by graphic design students in their ideation process?

2.3 Graphic design education

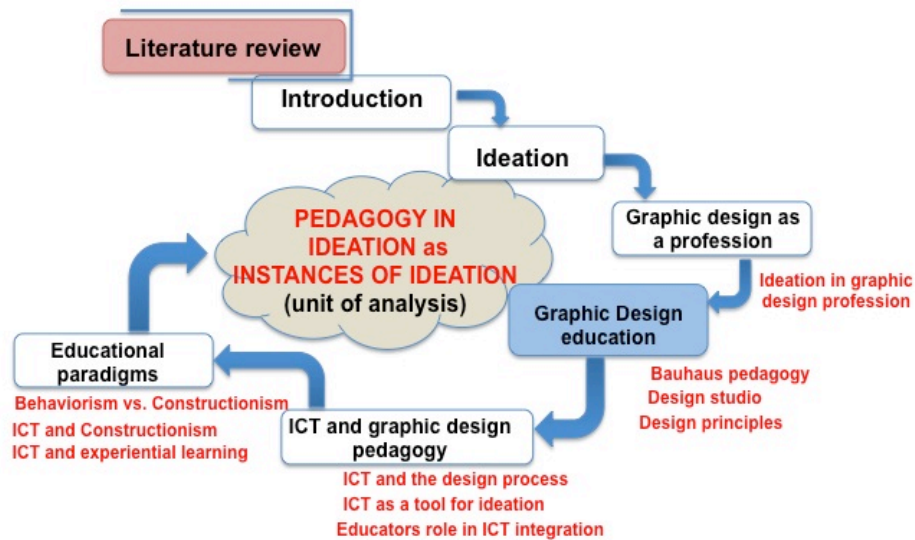


Figure 2.5: Diagrammatic approach of the review of graphic design education

The practices of graphic design have been the model for design education since the days of the Bauhaus that defined the process of design as an object-centred one. Such a process has to produce an artefact or environment that solves a problem. These processes include the issue of ideation, which is fundamental to the design process, but is still viewed in the traditional model of professional graphic design.

According to Swanson (1994), the Bauhaus principle that was grounded in craft ideology provided the model for much of modern graphic design training. The subject matter of design exists in practice only in relation to the requirements of given projects by clients and real-world situations, which are simulated in the studios (Swanson, 1994:53). While design educators cannot discount that the Bauhaus idea has greatly influenced the terrain of design education (which includes graphic design), the need to re-examine the current pedagogy of graphic design education in the light of technological innovation is also paramount. The reason is that ICTs are conceptualised as being tools that can, according to technological optimists, be used by humanity to make the world a better place (Wang, 2011:189).

Ho (2010) concurs that design education has always been seen as trying to optimise the teaching and learning in design terms as in the real-world process, outcomes

and the curricula. Somehow educators will also try to apply strict adherence to professional practices in their teachings. In graphic design, strict adherence to logical processes is meant to make students identify how to match the needs with the related problems requiring design solutions and as a way of meeting the practical requirements. Every element in the teaching process therefore is to prepare students for working in the industry (Ho, 2010:1). The divergent view, which is seen within ICT and ideation, is not because educators do not agree with ICT use, but probably because of lack of clear pedagogy that informs the use of ICT as it pertains to the profession.

In the area of ideation, there is a paucity of theoretical research in the graphic design discipline, although research on typography, photography and creativity has been done of late (Schenk, 1991; Logan, 2007; Eckert et al., 2010; Stones & Cassidy, 2010; Wahab, 2010). Existing research also attempts to understand the problematic impact of computers on users, especially in the field of graphic design pedagogy and practice (Logan, 2007; Ellmers et al., 2008), but no empirically supported literature specifically addresses the impact of technology in the ideation process in graphic design education, especially in developing countries.

Yeoh (2002), a decade ago, investigated whether the use of computer software for graphic design projects could encourage or diminish graphic design students' creativity within the ideation phase. His study was done in one major university's graphic design programme in the United States. The study notes that computer technology inspires users and develops new applications for graphic design; he cites computers, as 'actual intelligence' for augmenting human problem solving (Yeoh, 2002:222). However he called for a review of the current pedagogy of the graphic design programme.

In view of what the strengths and limitations of computers in education are, it is interesting to note that the utilization of technology in pedagogy has many facets of inherent benefits as well as challenges. ... We can train students to acquire all the necessary skills for the job on the assumption that the skills acquired would be lasting throughout his or her professional life. Such an approach in design education today involving technology is altogether unrealistic – without some form of post-baccalaureate retraining or graduate education. Not only do we need to

review what is now being taught; the aim of teaching should include enhancing the creative productivity in students. However, the fear is of educational curricula that place a strong emphasis on correct or best answers arrived, through the use of logical thinking processes. This is a limited, out-dated, and exceedingly biased view (Yeoh, 2002:213).

The 'limited, out-dated, and exceedingly biased view' expressed by Yeoh (2002) intimates that graphic design education is skewed towards the use of conventional and traditional models of ideation. Such use of conventional and traditional models may not support the cognitive learning approach as prescribed by educators. An educational paradigm that encourages cognitive learning, especially in graphic design, needs to be encouraged, and design educators can use technology to facilitate that. In the current graphic design process of ideation, the use of computer programs to facilitate complex cognitive skills like problem solving and design composition should be encouraged. According to Yeoh (2002), 'the biggest challenge that graphic designers face today is not about mastering the technical aspects of computing medium, but introducing meaning and "life" into the design process and creativity is one valuable way to do so'. Yeoh (2002:212) therefore advocates design methodologies that stress 'the importance of skills, abilities, attitudes, values, and motives' that should promote cognitive learning.

In the broad sense, there appears to be a plethora of research taking place in design education. However, most studies speculate on emerging issues in the areas of design practices and processes, especially the integration of computers into our educational system in graphic design courses, and there is little on ideation (Yeoh, 2002; Kimbell, 2004; Stones & Cassidy, 2010). Significantly, textbooks on graphic design capture the various principles and ideas that one engages with when studying graphic design. However, it will be illogical to interpret that to mean the way it is being run through in the profession.

Chai and Xiao (2012) compiled and analysed design research published between 1996 and 2010 in a bibliometric analysis of *Design Studies*, an international journal for design activities and education. The purpose was to investigate the core themes of design research by analysing citations of papers in the journal, *Design Studies*. It also wished to ascertain the evolution and future trends of design research. The study identified the core themes centred on design process and design cognition. In

addition, it also revealed that the research method, protocol analysis, has become more popular in recent years among researchers. Unfortunately, neither graphic design nor ideation featured in the compiled themes, creating the impression that research into graphic design education will have to be intensified.

Nevertheless, graphic design programmes are on the whole, doing well as far as integrating into the profession is concerned. As Swanson (1998) remarks, even while some design educators are strengthening their liberal studies requirements, the tendency toward professional rather than general education at colleges and universities has been growing for the past two decades (Swanson, 1998:16). If educators are integrating professional and real-world situations into their programmes, exploration into how the features of ideation in the profession relate to graphic design pedagogy with ICT should not be out of place.

As an admonishment to educators, Yeoh (2006) asserts that educators should be actively involved in design-related research projects and should participate in collaborative projects with companies because when the problem is real, design educators are forced to engage in creative activities of problem solving in effective, functional, and creative ways. Only then, are educators able to guarantee the potential and effectiveness of the design curriculum. According to Yeoh (2006), promotion of conceptual and technical competence requires an evolving, adaptive and versatile educator who is a designer, communicator, and thinker. This is where idealism meets functionalism (Yeoh, 2006).

Ellmers et al. (2008:83) call for a review of graphic design education to encourage deep learning for students—an approach that encourages students to see both the thinking and making aspects of a graphic design project as a way to establish their own on-going learning practice in the profession. This is imperative if one realises that the ever-changing cultural, technological and economic elements in society seem to be affecting design education as well as shaping the need for optimised curricula of design courses. It is possible to achieve this, according to Ho (2010), by emphasising reachable goals and tangible outcomes. Reffat (2008) also advocates 'an ideal curriculum ... that merges information technologies into existing courses more progressively than is typical today and at the same time looks to the studio teaching method as a catalyst for shifting perspectives on the relevant areas of design theory and methods' (Reffat, 2008:900).

The nature and qualities of the design process are conceived as a creative, branching, iterative, and cyclical process based on multi-disciplinary knowledge. This process has to meet the requirements of products-production processes, which are structured to proceed in stages, to meet schedules and to be clearly product oriented (Mioduser & Dagan, 2007:136). Resnick (2003) also believes the purpose of graphic design education is to prepare students for professional practice (Resnick, 2003:16). It is therefore project based rather than subject based. Within such an educational paradigm, designers are trained to explore imagination, document ideas and see that they are properly built (Dale, 2006:3). Such a scenario is therefore seen as a process of informed synthesis, through articulation of models, diagrams and scenario visualisations, with which graphic design education today can match the complexity of real-world situations and have thus become the premise for assignment in design (Ranjan, 2005:1).

In contrast with the traditional graphic design education—based on principles of studio-based and project-based learning—design education currently typically engages learners in increasingly more complex design projects as they advance through the course, guided by feedback from teachers and other students (Ellmers et al., 2008:78). The teacher-centred education which characterised the Bauhaus principle should now give way to learner-centred education, where ‘the focus is on the strong points, preferences and learning style(s) of the learner(s)’ (Brown, 2005:2). Graphic design educators will now have to recognise the change of technology, user expectations, and consumer wants and desires. Graphic design educators should also understand and acknowledge the ever-changing cultural, technological and economic elements in society affecting design education as well as shaping the need for optimised curricula of design courses. This can be done by emphasising the attainable goals and tangible outcomes (Ho, 2010:1). With these changes in technological and user expectations, what are the guiding principles for a pedagogical review of graphic design education?

Stones and Cassidy (2010) advocate some review of graphic design education, especially within ideation, to reflect current technological changes in graphic design. The researcher concurs with their assertion that it is vital that educators equip students with the ‘ability to make well-informed decisions about tool choice and tool use during design ideation’ (Stones & Cassidy, 2010:439). But Stones and Cassidy

(2010), while agreeing that educators teach production skills using tools (including software), also examine the possibilities of teaching students how to use tools effectively to facilitate the generation of ideas, not just their execution (Stones & Cassidy, 2010:439). Using tools effectively in idea development should not be seen as synonymous with software applications. After all, who can teach current learners software tools in the current ICT era more than the learners themselves, since they are more technologically adept than the educators? Stones and Cassidy (2010) however concede that the tool choice can have an impact on design thinking and thus make a case for the two areas—facilitation and generation of ideas—becoming more strongly pedagogically linked at module level (Stones & Cassidy 2010:458).

Ranjan (2005) also had earlier called for a review of graphic design pedagogy in relation to ideation and ICT based on changes witnessed. Ranjan (2005) sees design as layers of complexity in a mandate to surge beyond the production of products and systems to include the economic, ecological, and spiritual. To him, the problem is not as sharply defined in its deliverables by the once-accepted parameters of aesthetics and function of the products design produced. These concerns led to the experimental development of teaching design processes and design thinking through a modified course that had evolved over many years, using a broad-based approach to design education.

The results of his explorations led to a rich matrix of experiences that build convictions and abilities towards design at a strategic level. They also provided teachers and students with the opportunity to deal with contextually relevant subjects in real time and a window into the future from the perspective of the school of design. Other schools adopted the new form of design education as a driving force within the contexts in which they work and exist (Ranjan, 2005). An example is the KaosPilot in Denmark, being implemented at the Faculty of Informatics and Design, Cape Peninsula University of Technology. In this scenario, the nature of design thinking is rooted in the realm of action, and closely connected to learning by doing, rather than by just learning theory to be followed by practice.

Being informed by rapid changes, especially in the design agenda and manifesto for education, this current study concurs with Ranjen (2005) that it is important educators give students an ‘approach to design thinking and action that can be applied to a variety of issues and contexts’ in formulating a new pedagogy for

graphic design education (Ranjan, 2005:12). Such an approach will mean devising the methodology that allows learners to construct their own meanings in finding solutions to their design problems. According to Kowaltowski et al. (2010), contemporary goals in higher education, particularly design education, will mean giving students required tools to stimulate the search for creative solutions to problems, as well as a solid scientific basis for decision-making processes. They therefore advocate the introduction of methods that may enhance creativity, especially in discussions on curricular reforms (Kowaltowski et al., 2010:454). State-of-the-art buildings, fancy equipment, and bungling bureaucracies aside, teaching is about inspiring curious minds, recognising raw talents, and challenging students to think beyond their perceived capabilities, especially in the field of graphic design where the methods and products are interactive and constantly changing (Yeoh, 2006:174).

Another area that calls for a review in current graphic design education is that of assessment. This is a dominant influence on the way in which students learn (Ehmann, 2005), especially within the context of the studio approach of critiquing. If the primary aim of using assessment is to define what is important for students to learn, in this case how they work, as well as to create the learning activities that engage students in that learning, then the plea of Ellmers et al (2008) for a review of assessment strategies in design education should be taken seriously. In another study on assessment in graphic design, Ellmers et al. (2008), emphasise the transmission mode of relaying experience, which allows students to remain active participants in, as well as take a deeper approach to their learning when it comes to assessment in the studios. The study by Ellmers et al. (2008) does show empirical evidence that assessment-focused learning activities can have positive implications for the learning experience by articulating the design process and reflecting on the design and learning outcomes (Ellmers et al., 2008). The study reveals that given the variety of ideas developing by students in the study, educators are able to draw attention to the way that the creative process contains underlying design principles and experiences, which can have substantially different outcomes for student learners. This is because in such situations, students are encouraged to identify the principles that underlie their design project (concept, proposal, argument, negotiation, testing and resolution, for example). This situation is at variance with current graphic design education that is rooted in the principles of the Bauhaus concept and continues to be the driving force.

2.3.1 Bauhaus pedagogy

The Bauhaus principle, as stated earlier, has informed the pedagogy of graphic design education, especially in the developing countries, and continues to be the most pervasive concept in design education in contemporary times (Franciscono, 1971; Wallis et al., 2010). This principle is still impacting on the teaching of graphic design. Its style of design has also influenced the pedagogy of design and is still widely accepted in design education, if not art education, in general. Its project-based pedagogy and ideology of studio method of teaching since the beginning of the nineteenth century has continued to influence curricula for decades (Broadfoot & Bennett, 2003).

Among the aims and ambitions which guided the establishment of the original Bauhaus were tailoring its teaching to the demands of industry, and it therefore sought 'to establish contact with the leaders of the craft and industries (Whitford, 1984:12). Such aims made the founders to be called 'masters' and students, 'apprentices' and 'journeymen' to signify that the school was to be part of the real, working world (Whitford, 1984:30). Moreover, the workshop was to provide the basis of teaching—instead of studios with workshop—as the tandem system. It has been suggested that the master/apprenticeship model shares a number of similarities with the 'studio' concept in today's design pedagogy in terms of the working environment, the use of projects and one-on-one interaction (Wallis et al., 2010:1). These similarities and achievements notwithstanding, there are still considerable technological and pedagogical gaps that require some re-direction and these call for pedagogical review in the current educational paradigm (Yeoh, 2002; Ehmann, 2005; Kowaltowski et al., 2010).

Lovett (2010) discusses the challenges and opportunities facing studio delivery in integrating art and design programmes under a new studio structure. Lovett's study is framed against the understanding that what is at stake in the attempt of the interdisciplinary studio delivery model is the preservation of a differentiation of material, critical and cultural positions within art and design studio practices. Such an interdisciplinary idea comprised the concepts and principles of the Bauhaus studio model. The principle recognises the facts of industrial production and distribution, that artists and designers do mingle to produce commodities, albeit specialised ones (Lovett, 2010:3). The reason for Lovett's using the Bauhaus studio

model, with which this present study partially agrees, is to recognise the potential for development and commercialisation through knowledge transfer and ‘entrepreneurial’ activity. It is also to emphasise the need for rational and objective analysis in the design process, later referred to as a self-conscious process that starts with a problem in the actual world (Liu & Bolton, 2011:3). However, since current definitions of graphic design now move across a variety of disciplines and media, what similarities of the Bauhaus do feature in current graphic design with ICT and its studio practices?

In the ‘workshop’ or studio model, the Bauhaus introduced the design process based on model making and encouraged experimentation and exploration (Gu, 2003:64 in Sintusingha & Wu, 2010:6). It also allowed for exploration of the real-world situation in the studios by developing experimental prototypes, to solve real-world situations (Gu, 2003:64 in Sintusingha & Wu, 2010:6). While Lovett’s (2010) study strongly aligns with this study, especially with learners finding solutions to design problems using real-world scenarios, it does not see the pedagogical inappropriateness to today’s educational practices. The model that clearly aligns with the Bauhaus typifies the teacher-centredness pedagogy, which allows for learners looking up to and following their ‘masters’ in the production of ideas to solutions. The current educational paradigm requires self-directed learning that plays such an important role in effective learner-centred education systems.

The other positive aspect that aligns with Lovett’s study is the Bauhaus principle that embraces the interplay between the technical and artistic ideas of a bipolar workshop structure. In the workshop structure, each student had a *Master of Form* and a *Master of Craft* acting as mentors (Bennett, 2000), a tandem system of workshop teaching that equipped learners with as much technical expertise as theoretical and creative expertise. Apprentices were instructed by masters of each particular craft (Workshop Masters) as well as by practising fine artists (Masters of Form) (Broadfoot & Bennett, 2003:3). This model, however, is informed by small class sizes, rather than by the large classes that typify developing countries currently. This situation makes the ‘master/apprentice’ system of model highly ineffective as far as ideation by students is concerned in the studios.

My study aligns with the assertion that before any progress can really be made concerning the process of ideation in graphic design, there should be a harmonious

relationship between technical and artistic ideas, as both clearly contribute essential elements to the design process (Bennett, 2000:8). But to the best of my knowledge, there has been no research to show that graphic design educators are really practising professional designers whose professional expertise and technical ideas clearly impact on their 'apprentices/students', at least not within scope. For architectural design education, such research may exist.

Design institutions in developing countries might have based their pedagogy on the Bauhaus, since their studios had operated with small classes, allowing for the 'interplay between technical and artistic idea of bipolar workshop structure in which each student had a *Master of Form* and a *Master of Craft* acting as mentors' (Bennett, 2000). One of the hypotheses of my study is that students will sidestep and distort the process of ideation as long as educator/learner interaction in ICT and studio activity is not guaranteed. This hypothesis is in reaction to large class sizes that characterise current graphic design studios in developing economies. Indeed such a situation has prompted this current study in an effort to explore and apply a suitable pedagogy for such studio classes with the advent of ICT. Even though traditional methods of teaching allow teachers to play several active roles in a design course, such as lecturing, setting exercises, critiques to guide students through given design problems, conducting evaluation and assessment, and guiding discussions, they do not provide active student participation. The traditional methods make student involvement passive, through listening, note taking, following instructions and practising the design skills discussed in critiques (Sagun et al. 2001:334). The situation is aggravated when the class becomes large, as pertains currently in developing countries.

Bender and Vredevoogd (2006) advocate a pedagogy that supports blended learning that will seek to support large studio courses. This argument supports the idea that since studios are unique learning environments embedded in a historical context, educators cannot do away with the traditional aspects. They therefore advocate the infusion of the traditional studio with online technologies that will serve as best practices. This current study may concur with their argument that today's studios have become more technological as the profession has been transformed and it therefore require digital integration (Bender & Vredevoogd, 2006).

Bender and Vredevoogd's (2006:114) argument is informed by the fact that

technology is moving higher education from the traditional campus of 'brick and mortar' to the electronic classroom of 'wire and chip' ... The Internet has revolutionized the design process by allowing designers to research new products, download specifications, access code information, transfer drawings, and even synchronously collaborate with colleagues from around the world ... The use of digital media is a logical addition to the traditional design studio. Technology has radically changed the way educators can exchange information with students. Higher education support systems have adapted to changes in technological innovation, but the studio has remained disturbingly constant. Pedagogical integration of digital media is critical to the success of future architecture and design education.

With such tremendous technological changes, the Bauhaus studio pedagogy requires some review to integrate current technological changes, which would facilitate better student learning outcomes. As Bender and Vredevoogd (2006) argue,

'integrating blended learning with the traditional studio can increase student learning. Moreover, technology provides several benefits to students. It can be used to present information in a variety of formats, accessible at all times, and leaving live class time for the intellectual communications that only people can provide' (Bender & Vredevoogd, 2006:119).

Yeoh's (2002) findings also support the assertion that integrating technology into the traditional Bauhaus pedagogy can support student learning. Yeoh's study revealed that students were able to develop and expand their creative capacities during the design process when the computer medium was involved. What further emerged from the study was that the computer aids in the exploration and development of students' design ideas by developing the quality of their initial sketches into a tangible format. For some students, the computer medium is even capable of replacing or alternating their manual skills by letting them discover new interpretations and expressions of ideas with technological tools (Yeoh, 2002:161).

In concluding this section, it is imperative to note that since the current pedagogy of

graphic design education continues to align strictly with the Bauhaus principle of master/apprenticeship, with concomitant small studio sizes, my study proposes a hypothesis that **‘students will sidestep and distort the process of ideation as long as intense educator/student interaction in ICT and in studio work is not assured’**. This also calls for an exploration into activities that take place in current design studios within institutions of learning.

2.3.2 Design studio

Two decades ago, the traditional studio concept was attacked for its ‘hidden curriculum’ by Ward (1990). Ward (1990) contends that the hidden curriculum runs contrary to current educational processes and reinforces the ‘hierarchical, top-down models of authority of most institutions, and inhibits truly independent thought’ by students. He concludes that for designers to improve the quality of their professional services and products, what is needed is no less than a radical transformation of the design education system. Ward (1990) adds that such transformation must address the issues of the hidden curriculum, and should, as a consequence, include a process of increasing democratisation of the studio context and content. The democratisation of the studio context will mean allowing students the freedom to develop their own style of design, by using tools with which they feel most comfortable in making their own meaning, and by learning from the results of their actions and interactions with the tools.

Since then, many researchers in design have emphasised the idea that design in the studio is not simply an act of doing, but one which requires a controlled conduct not based merely on an activity, but on skills and reasoning, which strips it from being merely an action, and thus takes it to another level where it is now considered as praxis (Uluoğlu, 2000; Öztürk & Türkkan, 2006; Hasirci & Demirkan, 2007). In its context, structure, pedagogy and nature, the ‘studio’ has seen some transformation from the pre-nineteenth-century master/apprenticeship model influenced and positioned by two schools, the École des Beaux-Arts (French) and the Bauhaus (German), and is now experiencing digitally-oriented and virtual type in its professional and educational settings (Kolarevic et al., 1998; Kvan, 2001; Schnabel & Kvan, 2001; Reffat, 2007).

In describing the studio in architectural design, Wallis et al. (2010) paint a picture of

the 'studio' typically as being central to the role of educating design students, because it facilitates learning during the design process, encourages the integration of knowledge and skills, and generates an environment where professional norms and standards are cultivated (Wallis et al., 2010:1). Furthermore, it is important to acknowledge that the processes of designing and how to teach design are largely based on the profession's tacit knowledge and experiences. Architectural design and graphic design might not be the same in their final output; however the design process remains the same. They share the same educational principles, especially when it comes to ideation and studio activity. Quoting Joroff and Moore (1984) in their article on **studio teaching**, Sintusingha and Wu (2010) note that 'in the education and training of the designer, everything that is necessary for creating a built space, the process from initial concept to full-scale creation, needs to be mastered in the learning process' (Sintusingha & Wu, 2010:4). Essentially, design studio teaching is thought to reflect the constructivist perspective, which proposes that the student constructs and determines his or her own learning' (Wallis et al., 2010:2). In as much as educators will have to guide students to follow the norms in ideation, students will have to be guided to construct and master their own track of idea development. It might be unconventional, especially with ICT, but the pedagogy should encourage fusion and development of a student's own track of idea development. By so doing, each student in the studio learns from another's experience, leading to a well of knowledge and ideas.

Reporting on a research by academics and managers in their understanding of what the studio means, Wallis et al. (2010:2) generate the following themes:

- A. **Physical workspace for students (includes dedicated studio space or for a day):** '[The] studio is a dedicated space for the students with significant access' (West Australia – academic manager).
- B. **Teaching space (physical, concept or virtual):** '[The studio is] not a place. It is a site for learning. They are classrooms not an individual place with ownership. The studio is an intellectual rather than a physical place' (South Australia – academic manager).
- C. **Collaborative/peer learning:** 'It's not just an idea. It has to be a physical place, it has to be a place where students and staff interact in meaningful ways where ideas are the basis of a discussion and where there's a high level of mutual support amongst the students and between the students and staff' (Regional – academic manager).

- D. **Teaching approach:** 'The studio is a type of delivery rather than a physical space' (NSW-staff).
- E. **The design unit:** 'The studio dominates far too much; absolutely absurd. The students said there should be more points allocated to design because that is where they spend the majority of their time' (NZ – staff).

The above themes and revelations elaborate a situation where current pedagogy for design education as far as the studio and its practices are concerned, will need some modification and updating, if we are to embrace ICT effectively with graphic design education. This is because the descriptions of the 'studio' are now multi-faceted. If the teaching of design in the studio is 'providing the student with a self-conscious experience about what he/she is doing' (Ulukoğlu, 2000:33), then today's students will need to be encouraged to master the use of ICT in their design education. However, such experience will have to begin with the proper orientation of studio practices as far as ICT and design integration are concerned.

Discussing a framework for a contemporary design studio, Saghaei et al. (2010) assert that 'given that change is inevitable, frameworks need to be developed that facilitate prediction and support planning. For instance, ICT has improved continuously and now offers new potential. As a result, sustained research is necessary to study the effect of the new technology in terms of addressing the problems in [the] virtual design studio' (Saghaei et al., 2010:4). They therefore propose a framework for the design studio that engages content, methods, outcomes and the learning community when addressing pedagogy for the design studio (Figure 2.6).

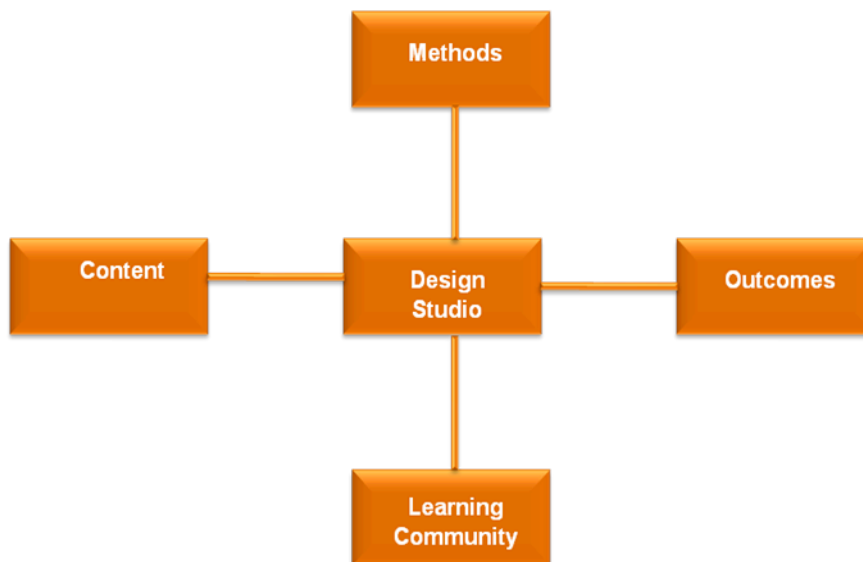


Figure 2.6: Factors relating to the design studio (Saghafi et al., 2010)

On examining the model, there seems to be some disconnect with community and methods as they relate to the outcome. Arguably, the model seeks to apply to what should inform current design studio pedagogy, which is content, learning community, method and outcome that one seeks to generate in designing a new pedagogy for the design studio. If ideation within graphic design education as far as ICT is concerned will be meaningful to the current situation, then the virtual design studio concept should be the focus for investigating new phenomena for design education.

The establishment of the virtual design studio also comes with its challenges, especially for developing countries. Kvan (2001) paints a picture of the difficulties design educators face when establishing a virtual design studio (VDS):

The environment introduces problems that work against the pedagogical ends. The technology is not cheap to acquire and difficult to support. The problems of communicating over a computer network appear to multiply geometrically based on the number of participants — a large class can therefore be very difficult to support. At a time when many universities are reducing funding, how can we justify spending money on such experiences? (Kvan, 2001:345)

However, in conclusion, he proposes an answer:

[The] advent of the VDS appears to raise promising opportunities for reconsidering the way we teach design. It changes the relationship between teacher and student and student and the rest of the world. In this way, it opens up numerous opportunities. We have an opportunity to reconsider the teaching methods we employ and adapt them to these opportunities, rather than forcing the new process into our recently adopted conceptions about appropriate ways to teach in a design studio (Kvan, 2001:353).

It seems to suggest that educators in developing economies will now have to look at the VDS as a way of re-engaging our graphic design pedagogy in a way that will make useful the introduction of ICT in current curricula. But this also calls for reconsidering our teaching methods.

In adapting to new pedagogies for the new design studio teaching, this study again identifies with Saghafi et al. (2010) who advocate that the main constituents for their model should have the following as mediators that will connect in the formulation of the pedagogy:

Technology: media, presentation and ICT tools, delivery's mode of knowledge, multimedia resources (texts, graphic, 3D model, video).

Assessment: evaluation, comment, correction, jury, critique content: (what) materials, resources, course.

Physical Environment: (where), physical, spatial, or virtual aspects, spatial conditions, furniture and facilities to accommodate learning.

Culture: different social environments, collaboration, interaction, communication (Saghafi et al., 2010:3).

Such a model will therefore mean that for technology to impact positively in the new design studio, its method of application, together with its content, will be the driving force. Moreover, its assessment will also depend on the learning outcomes and methods of a particular work or assignment to be done in the studio. Such issues and ideas will call for interrogating the appropriate technology required, the assessment techniques and requirements, culture, and also the physical environment, which are critical factors to consider (see model in Figure 2.7).

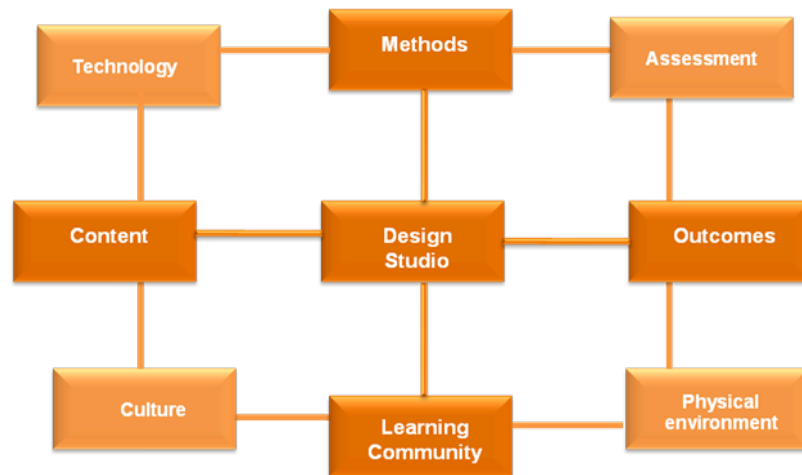


Figure 2.7: Essential factors and their relation to the design studio

Commenting on the process-based approach for the design studio, Öztürk and Türkkan (2006), emphasis that:

the design studio experience ... explores certain potentialities, which the design studio as educational medium might offer. It aims to open up and specify the practice-based model of design-as-object, by exploring the design process itself as a methodological tool. ... Exposing such instances to consideration allows inherently different levels and issues of design thinking to be discerned (Öztürk & Türkkan, 2006:97).

Since design, inevitably, involves both conceptual and practical levels of thinking, it can be concluded that the studio offers the platform where various sources and activities are involved in generating and formulating a sound basis for credible design, through 'activity, event, relation, a state of mind, a given space, a tool or object' (Öztürk & Türkkan, 2006:103). Such an ideation process will mean adapting the principles of design as they relate to the pedagogy.

Within the studio, learners' objectives could be directed and guided for effective execution of desired objectives through critiques, juries and outside professionals whose works act as inspiration to the learners (Broadfoot & Bennett, 2003; Wallis et al., 2010). They are also seen as problem-solving settings where educators who are experienced in the act of designing, tutor students individually or in groups, as per the Bauhaus model. The central method of teaching design has not changed substantially from these historical models as far as studio teaching is concerned.

However, the notion of studio seen as the physical space with a unique pedagogic method seems to be changing (Broadfoot & Bennett, 2003:3).

With the scope of graphic design (professionally and academically) changing, and the notion of the design studio also changing owing to technological advancement, it is important to ask these questions:

- How do graphic design students and educators perceive ICT in the pedagogy of ideation in graphic design?
- What informs the use of ICT by graphic design students in their ideation process?
- How does the introduction of ICT affect the teaching and learning of the ideation process in graphic design, especially in the modern studio?

2.3.3 Design principles

In the teaching and learning of design, the principles reside with the pedagogy. Herrington et al. (2009), discussing design principles relating to mobile learning in their research project, quote Van den Akker (1999), and agree that design principles are the characteristics of a planned learning design (what it should look like), and its procedure (how it should be developed)' (Herrington et al., 2009:130). In effect, 'design principles are best expressed in active terms that enable their ready use by teachers and designers presented with similar contexts and problems'. These principles are often presented in a form that lists criteria of particular learning environments and outcomes, and when presented this way, often start with a verb (Herrington et al., 2009:130).

In agreeing with these principles as they apply to graphic design, it stands to reason that the ability to apply certain principles will rest on the premise that such principles are the foundation of the results of the outcome. While graphic design might rest on the principles and concepts of the Bauhaus, outcomes, being the result of what designers are producing currently, might not be the direct result of such principles. Probably a new set of principles will need to be compiled for what is happening in the field. Herrington et al (2009:137) remark in conclusion that 'not all principles may be relevant or necessary in all tertiary learning contexts' and perhaps this might apply in the current situation when design principles are applied with ideation in graphic design with ICT. Current principles should be expressed in a way that can actually inform the practice (Wang & Hannafin, 2005).

Despite that within art and design education there is no consensus on the role of ICT or even the validity of its role in the arts, there seems to be little controversy about design principles. Perhaps this is because educators have not been able to clearly answer the question of whether ICT is a tool or subject, in respect of the pedagogy of graphic design education. This study corroborate Radclyffe-Thomas's remarks that, in order to develop and implement an appropriate educational system for the twenty-first century, the question of whether ICT is a tool or subject must be addressed (Radclyffe-Thomas 2008:159), especially as it relates to the pedagogy of graphic design.

Wozencroft (1994), about two decades ago, painted a picture of the dilemma of the pedagogy of graphic design education. In the introduction to his book, Wozencroft (1994:7) makes some astonishing assertions:

Design as we know is dead. Split between established practices and the guerrilla of younger designers, its functions of making invisible ideas tangible have been eroded by the computer's tendency to turn tangible forms into either. Design's new state as a formless medium brings opportunities for the research and development of new ways of communicating. Just as the camera challenged artists to develop new forms of abstraction, so the breakdown of the designer's traditional role allows for the birth of a new visual language.

Since the fulcrum that establishes graphic design education and the profession—the principles and ideals of the Bauhaus—is being challenged by ICT and its technologies, especially within studio practices, it is incumbent upon design educators to start looking into current pedagogy. Educators cannot play the ostrich in situations where technology is clearly throwing overboard the principles in use in establishing the profession. Wozencroft (1994:13) further buttresses his claim: in respect of typography, the introduction of Adobe Photoshop has also enabled designers to distress image and type, manipulating shape, density, detail, and letters, all without ideation principles of graphic design. What this means is that the traditional pillars of design language, as far as typography is concerned, have quickly been forgotten, and we now have the opportunity to develop freeform designs.

Corroborating these thoughts in challenging design educators to search for new principles, Kowaltowski et al. (2010) advise that minimal restrictions on tools and design principles could enhance creativity in students, especially through the challenge of breaking the imposed barriers by adopting new and original solutions (Kowaltowski et al., 2010:454). This is against the backdrop that the principles that drive design education rest on the premise that design education basically comprises the simulation of real-world problems that seem to be solved in the traditional studios of the design institutions. Design-based research does not only focus on real-world problems, but also on the overall goal of improving learning, rather than proving that one pedagogical approach is more effective than another (Herrington et al., 2009:129). Accordingly, every effort should be made to gain from the theory, practice and reflection of the previous phases. The focus should always be upon improving the learning design, rather than proving that one approach works better than another.

Koskinen et al. (2011:8) affirm that

'designers are trained to capture fleeting moments and structures that others find ephemeral, imaginative, and unstable for serious research. They are also trained in reframing ideas rather than solving known problems. Above all, they are trained to imagine problems and opportunities to see whether something is necessary or not'.

It therefore behoves design educators and researchers to anticipate the changes in current pedagogy and try to find solutions to bridge the gap, especially in the era of changing technologies. Major changes to graphic design education have led to the introduction of technology in curricula. This in reality has undoubtedly influenced the pedagogy and the way design education should be seen. Currently, computer systems with their peripherals accompany the functions of the drawing boards and pencils. The change in equipment and platform is therefore changing the way designers think and work, as well as providing access to global information and collaboration (Sagun et al., 2001:333). The need to ascertain the impact of ICTs in current graphic design pedagogy should be the concern of all design educators and researchers, since the principles might not be same as previously. This need requires answers to the following questions:

- What happens to the teaching and learning of ideation in graphic design when students begin to use ICT in direct contrast to traditional graphic design pedagogy?

- How do the ICT methods affect the pedagogy of graphic design in a developing economy?

2.4 ICT and graphic design pedagogy

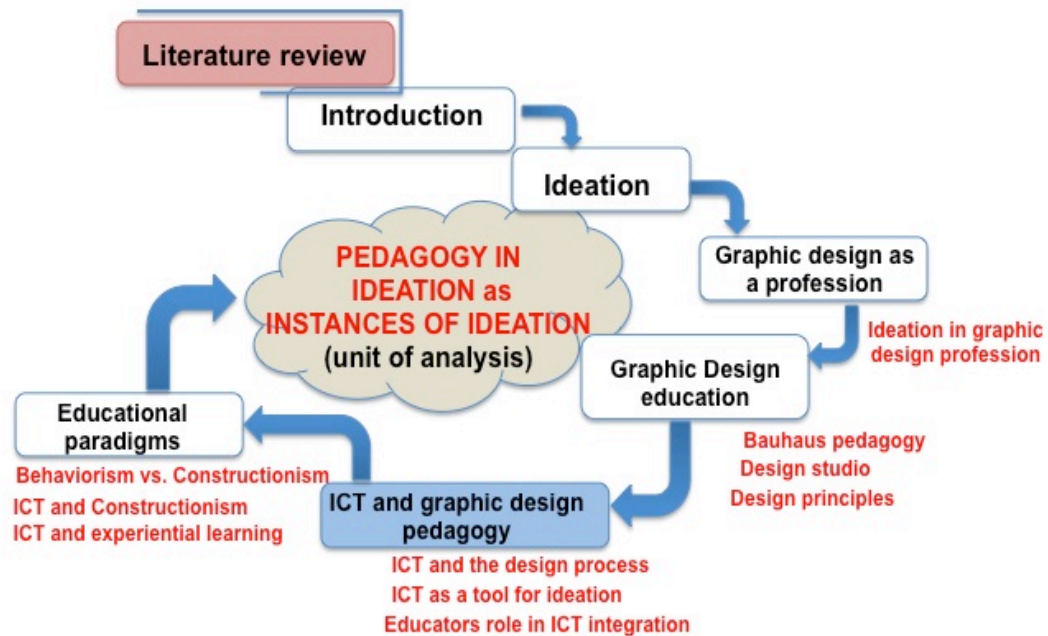


Figure 2.8: Diagrammatic approach to the review: ICT and graphic design education

ICT presents pedagogical challenges in the educational system, especially in respect of graphic design. While we yearn to embrace technology and ICTs, design educators continue to grapple with their use in terms of pedagogical imbalances. Reffat (2008), writing on the impact of information technology on the architectural design curriculum, wonders whether the basic structure of the design education programme needs to fundamentally change to fully realise the new opportunities and changing perspectives offered by information technology (Reffat, 2008:900). The problem may not be the technologies; probably our desire to embrace technologies seems to have overshadowed that. According to Wang (2009:211), the principal problems associated with using ICT for design educational purposes appear to be a persistent failure to find a link between theory and practice and the difficulty of training teachers to use ICT creatively.

Reffat (2008) advocates an ideal curriculum that merges information technologies into existing courses more progressively than is typical today, and simultaneously

looks to the studio teaching method as a catalyst for shifting perspectives on the relevant areas of design theory and methods (Reffat, 2008:900). This is because computers are becoming a valuable medium for designers compared with the use of conventional media in respect of ideation in graphic design. ICT might not be the main medium for ideation, but it should be indispensable, depending on where one might argue from in the swing of the pendulum. Quoting Schmitt (1997) and McCullough (1996), Reffat agrees that computers in the near future will be expected to play a more important role than being a mere medium; they will become a reliable partner in the design process when they are placed as knowledge integration tool, decision support tool, and design tool (Reffat, 2008:900). Currently in ideation, the possibility of its involving all three phases seems to be realised. Reffat (2008) therefore proposes a 4-primary framework for effective utilisation of IT in design education, being (a) advancing IT education in design; (b) strong infrastructure; (c) IT- based pedagogical focus; and (d) cognition-based IT tools.

In its third component of 'IT-based pedagogical focus', this study agrees with Reffat's (2008) suggestion that while pedagogy can be a personal matter, it is more often conceived of as the art or science of teaching—a set of principles and practices to improve learning. Educational technology, as a subset of pedagogy, is the sound use of any technology to support and improve learning. IT, on the other hand, focuses more on the digital delivery of information. I believe that technical issues might tend to take precedence over the delivery.

In his doctoral dissertation, Yeoh (2002) reports on the conventional use of ICT ideation by students, especially for their sketches and drawings. According to Yeoh (2002:68-69), such conventional use, even though it might not be acceptable in the pedagogy, does lead to some learning outcomes.

Sketching materialises the content of an image and is importantly linked to the formation of images. Because it can be perceived in different ways, sketching can be reinterpreted and this creates many opportunities for explorations. It is also an important tool for understanding and discovering design paradigms. Design paradigms can act as powerful tools for creating new designs since they encourage interactivity, negotiation, and communication between art directors, other designers in a design studio, as well as designers and their clients. By

exploring new paradigms and applying learned paradigms, designers learn what works and what does not.

On the issue of sketching, Jonson (2004) does not see ideation as being captured by sketching but rather as an interaction or dialogue between visualisation (non-verbal) and language (verbal). He sees sketching an idea as a 'sense-making' activity. He also suggests that a relatively small amount of traditional sketching is needed in ideation, even though he does not support freehand drawing. What is not captured in Jonson's study is whether such freehand sketching is by computer technology or software. Currently ICT allows designers to draw using software (McCormick, 2004) especially in the conceptualisation stage of ideation (Reffat, 2007; Wang, 2011). Developing initial ideas on the computer is still a form of sketching ideas in order to solve the design problem, though digitally.

Wang (2011) makes a case on how computers can benefit design education, especially in the area of ideation, and calls for the inclusion of ICT in the curricula. Of particular importance is that computers are now being used in design education as sketching tools from the very beginning of the design process. This represents a daring innovation that many design educators still resist, but there seems to be no doubt that this is how ICTs will be used to increase the creative capabilities of students in the future. According to Wang (2011), what designers do most of all is synthesise or create, so anything ICTs can do to enhance creativity is certainly valuable for design education (Wang, 2011:191).

Knowing what methods of ICT are available for the teaching and learning processes of ideation in graphic design and how effective they may be, will require understanding the perceptions of ICT by design educators and students in the current design process and pedagogy of graphic design education. Educators and researchers will therefore have to find answers to the following questions:

- How do graphic design students and educators perceive ICT in the pedagogy of ideation in graphic design?
- What informs the use of ICT by graphic design students in their ideation process?
- How does the introduction of ICT affect the teaching and learning of the ideation process in graphic design, especially in the modern studio?

2.4.1 ICT and the design process

Traditionally, the designer's way of thought has to go through the design process to communicate effectively (Bender, 2005). The design processes—problem identification, brainstorming/thumbnail sketches, roughs, finished rough/comprehensive, and the final design—will have to be followed through as the laid-down rule (Schon, 1998; Cross, 2001). Altering it could endanger the smooth process of idea development, even though this is done in line with the process, so that when a problem is identified, the relevant ideas are still encoded in the subconscious mind and then given 'life' by the use of thumbnail sketches. The design process enjoins the designer/student to go through this series of ideas in emerging with a creative solution for implementation. Dewey (1934) also described the design process of problem solving in five logical steps: (1) a difficulty is felt; (2) the difficulty is located and defined; (3) possible solutions are considered; (4) consequences of these solutions are weighed; and (5) one of the solutions is accepted. Other models see the process as including *preparation, incubation, insight, elaboration, and evaluation* (Wallas, 1926; Osborn 1991), and this is also captured in the ADDIE model. Through the process of *preparation, incubation, and insight*, ideas suddenly fall into place and a creative solution becomes clear. The fourth stage of *elaboration* is used to check for practicality, effectiveness and appropriateness and the solution is elaborated and fine-tuned as necessary. The *evaluation* is where the final solution is checked for its viability or otherwise, and the cycle may begin again.

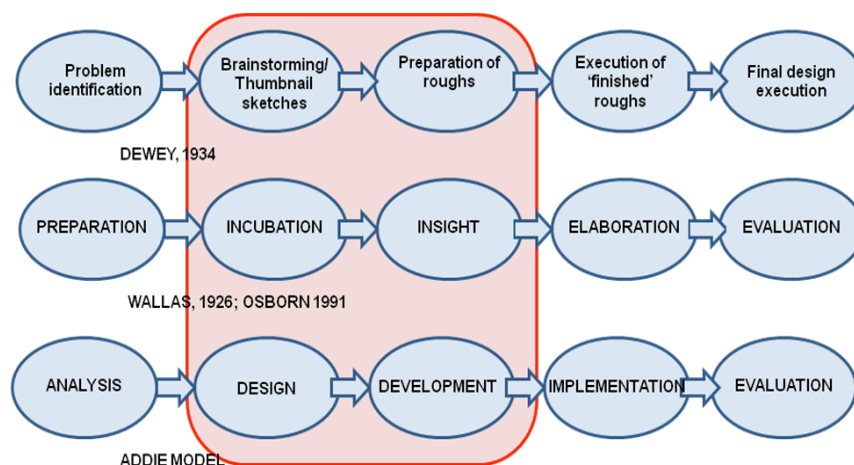


Figure 2.9: Diagram of the ideation process as captured in the of design process by Wallas (1926), Dewey (1934) and the ADDIE models

The crux of the process is set within the *possible solutions* (Dewey, 1934) and

incubation (Wallas, 1926; Osborn, 1991). Even though these are not sharply defined as the ideation stage, they contribute strongly to the design process required to arrive at a solution for a creative work. These areas as described, technologically involved the use of ICT in today's design pedagogy. However, the position where ICT fit in these processes of ideation in the current pedagogy seems to be blurred. Whether ICT is helping to solve the problems of ideation in design education - by following the creative models required in design education or rather toning down the rigorous processes in creative process - is something researchers need to know. In their article, '*Creativity in the design process: co-evolution of problem-solution*', Dorst and Cross (2001) suggest that creativity in the design process can validly be compared to such 'bursts of development' (Dorst & Cross, 2001:4). Such idea might not come strictly from ideation as captured in process-focus model, but through the learners' scanning of the Internet or the webquest. Cross (2001a) in trying to compare human and machine performance in the design process acknowledge that there is always something ICT can do better and to enhanced design. However, the value of the enhancement will depend on the way the designer's mind feeds into the human-computer interaction. For Cross (2001a), the computer 'can be programmed to do a lot of the design work, but under the supervision of a human designer'.

Tracing this role as far back as the 1980s, Crowe (1988) comments that ICT can assist with exploring design problems, enhance artistic decision making and provide new opportunities for learning. Since then, literature has emphasised the prospect of ICT's supporting visual art and design teaching and education. These are incredibly exciting times, offering new possibilities (Long, 2005). ICT offers design students opportunities for creativity in all areas of the curriculum. But to promote creative thinking and behaviour, time is needed for experimentation with the tools and the media, with the aspect of integration—the combination of instruction and construction in appropriate conditions, which is critical (Cronjé, 2006:398). This aspect of integration, together with students' identification of knowledgeable materials to arrive at a solution, may or may not involve sketching or drawing, even though the desired result is achieved. This is because students, among other things, can include personal imagery in support of their design expression, to which more traditional approaches can sometimes act as an impediment. The advent of digital image manipulation software, and equipment like scanners, has removed some of these difficulties, especially for less able students. This therefore allows for a more open definition of the purpose of drawing as they depict the ideation process

required in the design process. However, the traditional drawing concept of ideation is not seen here, as this might move beyond a likeness of 'hand rendering' an object (Long, 2001).

If graphic design education is to progress in ICT, then it behoves students to develop greater autonomy and confidence in their selection and use of information sources and tools. Students are expected to develop into discerning users of ICT, with increasing awareness of the benefits and limitations of the systems they use. They should be able to present their ideas in an increasing variety of ways with a developing sense of audience. In this way, their ability to evaluate their own work grows, and they become progressively more able to discuss and appreciate issues as they reflect in their ideation process.

Bender and Vredevoogd (2006:114), in advocating blended learning, caution that the use of blended learning be viewed in a more favourable environment if positive student learning should be achieved. What this means is that there is a blurring area for ideation as informed by the Bauhaus pedagogy and current models as presented by ICT. And for this research, an exploration of such pedagogy is an intellectual exercise that requires urgent attention. Consequently, this research interrogates the hypothesis that:

- ICT in graphic design education can create a synergy between educators and students and the potentiality of technology.

Conversely, educators' role in the integration cannot be over emphasised.

2.4.2 ICT and tools for idea development

Traditionally, idea development has rested on freehand sketches (Jonson, 2005) with drawing tools like pens, pencils and even crayons. In design, tools are also used to externalise ideas and mental images (Stones & Cassidy, 2010:439). According to Jonson (2005:617), the word 'tool' might invoke the mechanical, rather than the digital age. Yet 'tool' can be used for representing both action and thinking, as in 'thinking tool'. Comparing how design students and practitioners use conceptual tools in everyday design situations, Jonson (2005) shows that verbalisation, rather than freehand sketching, is the major conceptual tool. His study also reveals the computer as an emerging tool for ideation in all design domains, along with a range of tools like words, sketches, computer and sketch modelling in the ideation process.

Stones and Cassidy (2007) make some contributions on ICT tools with ideation. Their study presented the results of an empirical experiment designed to compare synthesis strategies adopted by novice designers when using paper-based and computer-based tools. While experts and professionals may apply less 'thinking' in establishing their concepts in ideation, it does not discount the role of mental agitation that go in developing the concept. If nothing at all, it is the level of mental models that might differ as explain by researchers on novice/expert problem solvers concerning the role of mental models in characterizing design performance at the different levels of expertise (Mioduser & Dagan 2007). Mioduser and Dagan (2007) are emphatic in agreement with researchers that the expert problem solver is assumed to possess powerful, dynamic and flexible mental models which adapt to different contexts and improve over time. However, this assumption does not mean the novice designer is not adept to problem solving techniques. In an era where the average graphic design student is embroiled in technology, their dynamism in using technology for ideation cannot be discounted, especially with sketching, where it is now known that digital ideation tools abound.

Comparing digital ideation tools and that of the traditional tools, Stones and Cassidy (2007) acknowledge sketching as an important tool for the design process, since it lightens the load on memory constraints and also supports early design thinking through its ambiguity and fluidity (Stones & Cassidy, 2007: 60). However, they are quick to point out that sketch as a tool and others are not always used in isolation - a sketch may be consulted whilst at the computer screen; a word may trigger an idea rendered in sketch form. In addition, the designer may approach one tool with habits from another' (Stones & Cassidy, 2007: 61). They therefore highlighted 'digitisation' – the digital design tool – as another form of tool when it comes to ideation. The study was limited by the lack of information about the cognitive processes occurring during the design task, which may be elicited by the use of accompanying thinking aloud protocol analysis. The experiment involved students from a particular course; New Media and therefore results may be coloured by particular pedagogical approaches practised over there. The study recommended further studies, broadened to include students from other disciplines such as graphic design, and could be accompanied by analysis into teaching and assessment methods, especially with digitisation.

In a later study, Stones and Cassidy (2010) discuss and examine the impact that design tools had on reinterpretation during graphic design ideation activity. The study touches on differences in ambiguity levels between conventional paper-based sketches and digitisation. Digitisation refers to any computer-based graphics software in which selection and manipulation of pre-defined shapes or freehand lines can occur (Stones & Cassidy, 2010:440). In current activity with ideation in graphic design, digitisation might comprise the greater percentage, both in the lecture room and in professional studios. Activities that lead to designers' thinking and concretising ideas might mostly be captured through digitisation, making the software an indispensable tool for graphic design. Theoretically, perceptions and thinking help one to concretise ideas into cognitive actions as in ideation in graphic design. With the advent of ICT, designers now have a wide range of tools to contend with, especially when digital ideation has become the order of the day (Stones & Cassidy, 2010). Stones and Cassidy (2010) have shown that the tool choice can have an impact on design thinking and this also makes a case for digital tools in the design process, as designers expand their horizons to think not only about traditional but digital ideation in design. This study provided informed discussion into the strengths and weaknesses of using paper and digital tools for ideation, making explicit what can be classed as good practice. The study attempted to identify how industry-standard tools were used by student designers—the strategies and their outcome—with the hope of aiding educators in their approach to teaching tool use. The study also presented a challenge on how best educators can teach the use of software designed primarily for efficiency and polished results in the ideation stage. Their study was emphatic that the tool choice can have an impact on design thinking and thus makes a case for the two areas becoming more strongly pedagogically linked at module level (Stones & Cassidy, 2010:458). This current study supports Stones and Cassidy's (2010) contention that digital tools in design education should therefore feature strongly pedagogically in current graphic design educational curricula.

Brown and Cruickshank (2003), reporting on their experience on 'The Virtual Studio' course, indicate that 'the world wide web can be a viable alternative to traditional face-to-face teaching even in the context of practical, creative subjects like photography'. They, however, indicate their 'conscious attempt' to 'pedagogically re-engineer' the course to exploit the properties of the web' as a tool to ensure that enough of the original aspects of the course module be 'retained to maintain the

exploratory, experimental and reflective qualities of the module' (Brown & Cruickshank, 2003:287). Graphic design educators should therefore begin to re-engineer their courses to take advantage of ICTs as design tools in the teaching and learning curricula of graphic design. This, however, will include computer technology as a tool for ideation in the pedagogy.

Radclyffe-Thomas (2008:158) asserts that using the computer as a tool for fine art may mean different teaching skills are required and different learning approaches should be enabled. Her article reviews international research on the adoption of ICT in schools and colleges and specifically looks at examples of good practice in art and design education. It also reviews trends in technology to determine the benefits and limitations for future practice. Moreover, It seeks to further the pedagogical debate around ICT use in art and design education and examine the extent to which ICT is conceived by educators as a tool or a subject in design (Radclyffe-Thomas, 2008:159). She reveals that

'although a minority of teachers have embraced digital art as a subject, and encourage full use of its potential, for most teachers technology is conceived of and used as a tool, an addition to their repertoire, part of the explorative process, with finished pieces most often still achieved by traditional means' (Radclyffe-Thomas, 2008:159).

One of the arguments against the use of ICT, according to her, is that students are 'getting carried away with what the technology can do, losing touch with the source which inspired them originally and losing sense of the outcome aesthetic' (Radclyffe-Thomas, 2008:160). This, however, does not discount the fact that ICT cannot be used as a tool that learners can rely on for developing ideas as far as the design process is concerned. Wang (2009:208), in ascertaining the benefits of ICT for students, remarks that for enthusiast students, ICT 'will help transform them from being passive and uncritical receptacles of past knowledge into being active and creative learners'.

In the closing remark of her argument, Radclyffe-Thomas (2008:160) asserts:

Using the computer as a tool for fine art allows risk-free experimentation, encourages spontaneity and means different learning approaches can be enabled. Traditional skills can be transferred to digital technologies and further developed; students can use digital images to find out

onscreen if their ideas work and to suggest new ways of working.

With the proliferation of digitally mediated imagery in the creative fields, including graphic design, some educators see the computer as a vital tool for fine artists of the twenty-first century and highlight the need for a re-evaluation of traditional methods of teaching design. Using an appropriate theory, it is possible to explore how such re-evaluation and re-engineering can best fit the teaching of ideation, as this study examines how students make meaning of their activity with computer technology, when they go through the process of ideation.

Spendlove and Hopper (2004) believe that ICT should be seen as a set of tools for developing ideas, and should be adopted as and when they are appropriate within the broad creative or design process (Spendlove & Hopper, 2004:2). Quoting Loveless (2002) in their paper, they argue that, by providing new tools, media and learning environments, creative teachers and learners can use ICT to support 'imaginative expression, autonomy, and collaboration, fashioning and making, pursuing purpose, being original and judging value' (Loveless, 2002:2 in Spendlove & Hopper, 2004:2). The problems that need to be tackled then are when and how these tools should be adopted for effective development of ideas as far as current pedagogies are concerned. As Spendlove and Hopper (2004) remark, 'it is now apparent that with the rapid introduction of new technologies, the time taken for them to be embedded into the curriculum and the time for them to impact upon pedagogy (favourably and unfavourably) is increasingly becoming shortened' (Spendlove & Hopper, 2004:5). The time has come for educators to have the greatest opportunities for reflection prior to the introduction of new technologies.

In finding a solution to a design problem, there is always the possibility of using various methods and tools to represent some of the most important factors, and this is also crucial to the knowledge of the graphic design problem. This becomes the crux for both students and professional designers. Discussing the methods and tools for supporting design innovations, Viganò and Carulli (2009) believe that 'the possibility to research information with different research typologies and to compare designed solutions on the basis of defined parameters can support designers' choices during the conceptual process activities' (Viganò & Carulli, 2009:392). Since the object of ideation in graphic design is basically to solve the design problem as creatively as possible, the thoughts on and use of relevant tools blur with the motive of conceptualising the idea. Current literature offers little guidance on how to identify

and capture the essence of this conceptualising moment among graphic designers or how to translate those cognitive explanations during the ideation process. Most studies speculate on emerging issues in the areas of design practice and process, especially the integration of ICT. Computer technology, made possible by hardware and software is now one of the major devices used in conceptualising, developing, and producing materials for graphic designers (Yeoh, 2002:37).

Thorsteinsson et al. (2010) note the contribution of ICT to idea development. In their studies, they show that ICT with ideation is possible digitally, through Virtual Reality Learning Environment (VRLE) technology. With Innovation Education (IE) there is the possibility that one could use the VRLE tool for ideation in many courses, including open and distance education (Thorsteinsson et al., 2010:314).

The study by Thorsteinsson et al. (2010) is silent on graphic design, but the issues discussed could be applicable to graphic design, where ideation is a key process in the design process. The drawing process described and the students' use of the CAD program diverges from graphic design where various drawing programs like Illustrator and other vector programs enable students to unofficially draw during their ideation process. Their arguments for the use of graphic tablets are really in support of the possibility of digital ideation, closer to the traditional method of sketching with a pencil.

My research is in support of Thorsteinsson et al. (2010), who point out that the success of such an adoption will depend on computer literacy, managing the VRLE in the school context, and the role of the teacher. The technology is already part of the students' lives (Thorsteinsson et al., 2010:316); they are already computer literate and will go to any length to develop new software techniques. It behoves educators to offer the positive force that will effect change and adoption of IE, and the resources and support that will enable students to carry the VRLE. Students always seem to be the initiators of some innovation, especially in graphic design education.

2.4.3 Design educators' role in ICT integration

One of the key determinants of the success or lack of success of any ICT initiative in education is the teacher, and in this context, the design educator. Educators need to change their traditional role in order to adapt to this age of rapidly developing

technology (Lim & Lee, 2008). Educators' input into and acceptance of the use of digital technologies, especially in providing positive student learning, are fundamental. Educators have the responsibility to manage and enable the context of teaching and learning, often described in relation to certain pedagogical theories, with regard to ICT in graphic design education (Thorsteinsson et al., 2010:315).

There are a number of problem areas for educators in giving students a critical understanding of what ICT can do in graphic design. Two issues emerge in respect of ideation and ICT integration. These are (1) the nature of educators' experiences as 'makers' of design themselves, and (2) the relationship between the designer and the tools with which he or she is working. These concerns may be unique to design teaching, where the practitioner's role and identity is both sensitive and particularly important. Design educators are often trained as practitioners but not as educators. They therefore have difficulty in dealing with education in any other terms than those they have experienced (Malecha 1985:74). In addition, for trained educators, their practitioner role often dominates in their instructional capacity. The introduction of ICT into the pedagogy of graphic design therefore has proved problematic and has upset delicate balances for many in the design teaching profession, especially with ideation. This may become clearer when educators and researchers examine the perceptions of ICT by design educators and students in current design learning and pedagogy.

Long (2005) paints a picture of conceptual confusion, which manifests itself in educators' looking backward at what might be lost, rather than forward at what might be gained, especially with ICT in ideation. Long (2005) decries educators' insistence in refraining from ICT innovations as they relate to design education. His main contention is that while it is essential not to lose what is the core of the design curriculum, there is a sense in which the oft-repeated statement that we are judging a new technology by old understandings seems to be very accurate at present (Long, 2005). It is therefore a possibility that a greater opportunity will be missed if too much emphasis is placed on preserving particular processes or materials—as if they are the most important aspect of the learning. This research therefore will delve into educators' roles in such pedagogy, since that issue becomes more critical as graphic designers try to embrace ICT in the curricula. This will be done with the assumption that teaching and learning of ideation and design processes in graphic design will become more effective, with the visual understanding of design students

developing and extending as we use ICT. This will give insight into the development of a framework that will be used in exploring ICT in graphic design education as it relates to ideation in the design process. This is crucial since educational paradigms seem to be changing rapidly.

2.5 Educational paradigms over the last decade

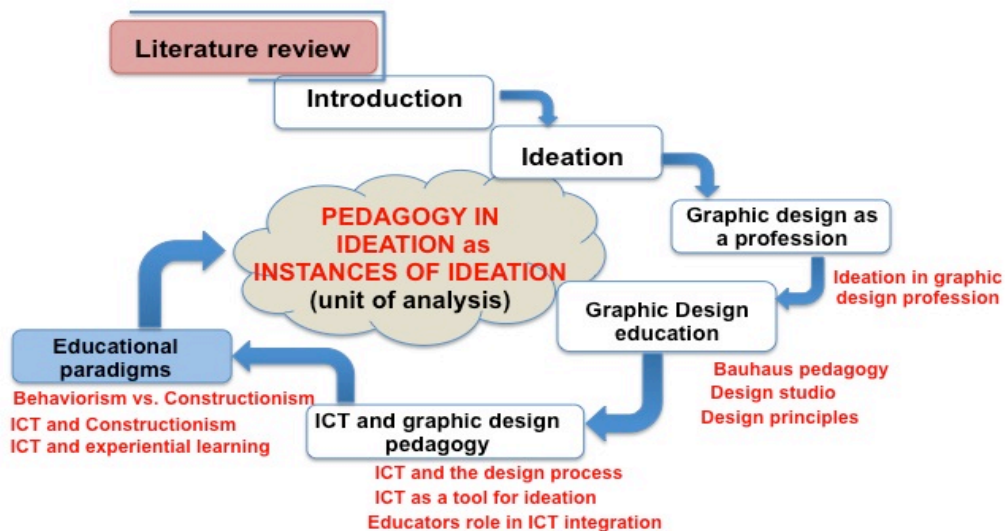


Figure 2.10: Diagrammatic approach to the review: Educational paradigm

Learning has undergone a tremendous paradigm shift since the beginning of the twentieth century. Various theories have been formulated in support of teaching and learning in education, especially as educational practices will continue to be subjected to change and renewal. These changes, according to Brown (2006), are 'due mainly to developments in information and communication technology (ICT), the commercialization and globalization of education, social changes and the pursuit of quality' (Brown, 2006:109). As a result, numerous learning approaches and concepts are also being advocated. One such is integrated learning technology for technological education that is being advocated within the virtual learning environment. In this concept, the individual must be able to adapt to novelty, a situation referred to as innovation education (IE). The environment of IE is increasingly relevant to ideation and collaboration. This is because IE is based on the notion that 'everyone has creative ability that can develop further to some degree through educational stimuli and self-developmental activities' (Page et al., 2009:11). Among the primary aims of IE, which seeks to support this research, are

to:

- see possibilities in using new knowledge to produce new products;
- stimulate and develop the creative abilities of students;
- teach, study and learn in certain problem and innovation-based learning processes, from identifying a context, where students develop their own meaning and realisation with appropriate models; and
- encourage and develop the students' initiative and strengthen their self-belief.

ICT encourages graphic design students to be more innovative in their approach to design development. The argument of ICT as a tool or topic in graphic design will be settled when educators adopt the IE approach in design education. According to Page et al. (2009), creativity and problem solving are not only intrinsic to design education but also to technology education. The creative process and problem-solving strategies based on technological education are important because they enhance the quality of solutions based on real-life problems. Ideation in graphic design is geared towards finding a solution, not only to studio work, but also to real life challenges in design. It is an essential part of the design process, both in education and practice (Broadbent, in Jonson, 2005:613). The Bauhaus principles, which call for the learner to open up to issues solely from the master, might not be the right educational paradigm for ICT integration. Such a paradigm might be that of behaviourism.

2.5.1 Behaviourism versus Constructivism

According to Atherton (2011), in educational settings, behaviourism implies the dominance of the teacher, as in behaviour modification programmes. It can, however, be applied to an understanding of unintended learning. Perhaps because behaviourists describe experiments in which they structure learning for their subjects, attention tends to fall on ideas such as behaviour modification and the technology of behaviourism. Behaviourism itself is more about a description of how learning occurs in the mind, as it were, than about how to make it happen, and it is when it is approached from this perspective that it gets most interesting (Atherton, 2011). In aligning it to this study, this means that in the learning process of behaviourism, the mind is excluded from the learning processes. The behavioural law, according to Jonassen and Rohrer-Murphy (1999:6), was a primary theoretical cause of the paradigm shift in learning psychology. In their discussion on

instructional system technology in the field of learning psychology, they (1999:7) debunk this assertion and explained the role of the mind as ‘a material entity that controls the actions of the knower’.

Jonassen and Rohrer-Murphy (1999) further attacked the theory of objective reality by positing that, ‘if our learning theory assumes that we construct meaning for objects and events by interpreting our perceptions of them in terms of our past experiences, beliefs, and biases, then each of us mentally represents our own personal reality’. Such idea inference means there will always be differences in the way we give meaning to a situation. In ideation in graphic design, it can be accepted as the basis for which educators cannot prescribe an approach for learners to gain ideas to achieve their design outcomes. This is because in graphic design, every design problem may have a different approach to its solution.

In contrast, Jonassen and Rohrer-Murphy (1999) advocate the need for objectivism and constructivism as the new philosophical paradigm for learning and education. They justify the role of objectivism—that there is an objective reality—as what learners assimilate. And since the role of design educators is to help students learn about the real world, it is the role of the teacher or the instructor to interpret events for them (Jonassen & Rohrer-Murphy, 1999:10). Juxtaposing this with constructivism, they concede that perhaps ‘what is transferred to the student is learned by the student without interpretation or reconstruction’. ‘Rather than attempting to map the structure of an external reality onto learners, constructivists recommend that we help them to construct their own meaningful and conceptually functional representations of the external world’. They further note, ‘objectivism and constructivism represent alternative conceptions of learning and thinking, much like the artist-scientist, two-world dialectic (Snow, 1960 in Jonassen & Rohrer-Murphy, 1999:12). Constructivist pedagogy holds the promise of transforming the relationship between teachers and students in the direction of empowering students to be much more active and interactive in the classroom (Means & Olson, 1997 in Wang, 2009:208).

Wang (2009) concedes that constructivism is not new. Quoting Von Glasersfeld (1989) and Hawkins (1994), he justifies this:

The fact is that this epistemological and educational paradigm resides at the heart of Western civilization in the teaching method of Socrates who

elicited knowledge from students by asking them carefully chosen questions. Human reason, leading to the discovery of eternal ideas beyond individual experience, after the manner of the ancient Greek philosophers Plato and Aristotle, was glorified during the European Renaissance, culminating in the philosophical writings of Descartes and the founding of modern science by Newton. Nevertheless, beginning in the seventeenth century, European philosophers started to question what humans can actually know through the senses and rationality. Locke, Hume, and later Kant all argued that objective reality, independent of the person experiencing it, is unknowable. Once this sceptical attitude became fairly well established among intellectuals, the development of constructivism as an epistemological and educational theory was inevitable (Wang, 2009:206).

According to Wang (2009), the strongest progenitor of constructivism should be the early twentieth-century American philosopher, John Dewey, whose teachings, he believes, constitute pragmatism. Wang (2009) refers to Dewey's philosophy as pragmatism because of its intellectual inquiry, which is not to comprehend reality separate from experience, but to learn how to function in the best possible way within any given situation. This, according to Wang, Dewey called 'a theory of epistemology instrumentalism, a term that has virtually the same meaning as constructivism' (Field, 2007, in Wang, 2009). Such teachings undoubtedly are known as pragmatism.

2.5.2 ICT and Constructivism

The introduction of ICT in design—its interactive and explorative nature—typifies the epistemology of constructivism in educational theory. Wang (2009), in his discussions on the transformational promise of ICT for professional educators in architectural education, posits that ICTs have the potential for radically transforming educational practice. He also agrees that ICTs promote the constructivist paradigm of epistemology (Wang, 2009:206). According to him, 'if constructivism had not already existed, it seems likely that ICTs would have invented it to explain how they operate' (Wang, 2009:208). Quoting Murphy, Wang (2009) emphasises technology as touted as an optimal medium for the application of constructivist principles of learning (Murphy, 1999 in Wang, 2009).

Significantly, educators are proposing a learner-centred theory of learning which allows the student to gain knowledge in his/her discovery process, often quoted as, 'students should construct their own knowledge'. In graphic design, students need to make informed decisions about the visuals and ideas that will resonate well with their thoughts. ICT allows students to search, and to apply their own creative thoughts, together with principles acquired in earlier projects. This helps in transforming them from being passive and uncritical receptacles of past knowledge into being active and creative learners (Wang, 2009:208). Such is Wang's support for ICT in design education, as emphasised in this statement.

Wang (2009) bemoans the issue of pedagogy when it comes to ICT in design, and questions why educators struggle to embrace technology while the necessary groundwork is not done, by getting enough pedagogical preparation to work with it.

Certain questions about implementing ICT for pedagogical purposes will not go away. Why is there such a gap between promise and practice? Who is to blame for the gap? Is ICT being forced upon the education system by enthusiasts and policy makers eager to be up to date and to compete in the global marketplace? Is constructivism, the educational paradigm that is always associated with ICT, appropriate for any level lower than postgraduate studies? (Wang, 2009:210)

Wang (2009) therefore advocates the need for scholars to continue examining these issues carefully together with other issues like the cultural context of ICT. Wang concludes his argument with the assertion that the 'principal problems associated with using ICT for educational purposes appear to be a persistent failure to find a link between theory and practice and the difficulty of training teachers to use ICT creatively' (Wang, 2009:211).

In her contribution to Foucault's 'limit-experience', Thompson (2010) notes a strong link between learning and the concept of transformation. My study agrees with Thompson and believes that the student gains a new perspective of the world, as well as of himself or herself, when learning. Learning leads to change and transformation. Learning also brings the individual in contact with a different view of the world, making it impossible for the student to maintain his or her initial viewpoint as before (Thompson, 2010).

At any point in time, one must see a change in the learning process. And this is even more significant with the introduction and use of information and communication technology. What used to work yesterday, might lead to new knowledge today that can also change the mode of learning and teaching tomorrow. With such knowledge, students are able to construct new ideas and meanings in their studies. And such change might cause a paradigm shift in the pedagogy. The benefit of ICT for students—at least according to the enthusiasts—will be to help transform students from being passive and uncritical receptacles of past knowledge into being active and creative learners, ready to take responsibility for the future (Wang, 2009:208).

Discussing the use, currency and integration of ICT in higher education, Stensaker et al. (2007) assert that 'current teaching and learning schemes have, so far, not been adjusted to the technological development' as far as ICT in design education is concerned (Stensaker et al., 2007:427). There are evidences that seem to suggest that the pedagogy of most of the design courses, especially in the developing economies, are still rooted in the Bauhaus principles of the 19th century (Ranjan 2005), even though design educators are struggling to embrace today's technology of ICT. In the studio method of graphic design education, students practise hands-on skills with the instructor observing and critiquing their work as they progress (Ellmers, 2006). Wang (2009:208) believes that through this hands-on, exploratory approach, and the interactive nature of ICTs, particularly the Internet, students are able to gravitate toward the postmodern epistemology and educational theory of constructivism.

One of the arguments against the use of ICT in the ideation process of graphic design is the elimination of the learner/educator studio interaction. Technology, however, affords the same academic interaction. The introduction of ICT requires 'a different approach for social interaction such as online chats, virtual office hours, group projects and interactive software with live video and audio' (Dale, 2006:4). In the light of this, it can be suggested that if ICT can make any meaningful impact in the teaching and learning of graphic design, then the pedagogy should be re-defined. Quoting Bates (2000), Stensaker et al. (2007) argue that 'the main intention behind the use and integration of ICT in teaching and learning is often to change how teaching and learning are conducted in the sense of putting more emphasis on interaction, flexibility and innovation' (Bates, 2000 in Stensaker et al., 2007:431). If such intentions are to be realised, it should then 'be in the link between purpose,

people and pedagogy that much can be gained' (Stensaker et al., 2007:431).

Making a case for a careful consideration of ICT implementation in university programmes for the education of design professionals, Wang (2011:191) argues for constructivism.

Traditional instructivist models emphasise learning as assimilating, while constructivist models regard learning as a combination of diverging, converging and accommodating. All things considered, constructivism, with its emphasis on student-centred, collaborative problem solving and its vision of the teacher/professor as a coach or a facilitator, instead of a disseminator of knowledge, seems to be very well suited to the education of professionals.

This view of constructivism gives credence to the hypotheses that:

- ICT in graphic design education can create a synergy between educators/students through technology.
- The teaching and learning of graphic design, especially in the process of ideation, will become more effective, and the understanding by design students of visual communication will develop and expand through using ICT.

2.5.3 ICT and EXPERIENTIAL LEARNING

Linked to constructivism is the experiential learning theory, which draws on the work of prominent twentieth-century scholars like John Dewey, Kurt Lewis, Jean Piaget, and others. One of the pillars of the experiential learning theory (ELT), according to Kolb and Kolb, is that ELT proposes constructivist learning (Kolb & Kolb, 2005), where knowledge is created and recreated in the personal knowledge of the learner. Kolb and Kolb (2005) define ELT as a situation whereby knowledge is created through the transformation of experience, as a result of the combination of grasping and transforming the experience. 'Not only does ELT combine cognitive and behavioural learning theories, but it also allows for affective changes to be recognised as learning' (Wang, 2011:191). Through experience, learners also create their own knowledge of ideas, which hitherto had not been conceived by either the learner or the teacher.

ICT allows design students to gain more knowledge in their ideation process than before and thus their 'traditional idea capturing' seems to be discarded. Not only do

they seek better ways to capture their ideas, but also the fastest way to make them real. Conceptualisation from the digital point of view also means focusing on the entire spectrum of design challenges. If learning is an active process of constructing rather than acquiring knowledge, and instruction is a process of supporting that construction rather than communicating knowledge (Duffy & Cunningham, 1996), then ICT is helping students to create knowledge when they engage with the various ICT tools in the ideation process. What seems unclear is what, how and where the instruction should be aligned, with the introduction of ICT. It is therefore possibly opportune for design educators and researchers to probe the emerging theory of 'navigationism'.

2.5.4 Beyond constructivism

2.5.4.1 Navigationism

Brown (2006), in discussing the paradigm shift in education, finds it difficult to accept that teachers and educationists still continuing to work within our 'content-driven' paradigms of constructivism. In his article, he discusses ICT's impact on education and the shifts in the educational system for the past decade. Quoting Restak (2003:57), he indicates that, 'within the modern age, we must be able to rapidly process information, function amidst chaotic surroundings, always remain prepared to shift rapidly from one activity to another and redirect attention between competing tasks without losing time' (Brown, 2006:109). Accordingly, 'providing our learners with preselected and carefully designed and developed content' in the current situation of changes in educational environment, especially with ICT means 'we are heading for a disaster, if we are not willing to take the leap out of this fatal paradigm' (Brown, 2006:116).

Brown therefore strongly argued for 'navigationism' as 'the new learning paradigm that lies beyond constructivism' (Brown, 2006:116). He defines navigationism as a learning paradigm where 'learners should be able to find, identify, manipulate and evaluate information and knowledge, to integrate this knowledge in their world of work and life, to solve problems and to communicate this knowledge to others' (Brown 2005:10). ICT allows graphic design students to locate the appropriate ideas within the virtual environment and studios, and to manipulate them for the development and execution of their desired objectives as far as the design process of ideation is concerned. They might have gone through the stages of ideation using the traditional pedagogy, but working within the virtual environment will make it

difficult for them to trace and document these stages as required by the traditional methods of ideation.

Brown (2006) concludes by exhorting design educators to 'focus on coaching learners to find, identify, manipulate and evaluate information and knowledge, to integrate this knowledge in their world of work and life, to solve problems and to communicate this knowledge to others' (Brown, 2006:116). 'Teachers and educators should become the source of how to navigate in the ocean of available information and knowledge. We should become coaches and mentors within the knowledge era' (Brown, 2006:12).

What is needed, and which will be much appreciated, is a paradigm that is underpinned by different principles, based not on the acquisition of isolated facts and knowledge, but on the development of multidisciplinary connections with global networks and participation in communities of practice, together with reformed teacher roles, and greater autonomy and agency for students. Educators should therefore adopt 'pedagogies that move beyond instruction to creativity, innovation and generative thinking' (McLoughlin & Lee, 2008:647).

2.5.4.2 New media and social software

McLoughlin and Lee (2008) also take the argument beyond constructivism. They propose a paradigm that blends social software, constructivism, connectivism and navigationism. In an increasingly digital world, where ubiquitous computing and demand-driven learning are the trends, there is a need to expand our vision of pedagogy so that learners become active participants and co-producers rather than passive consumers of content. McLoughlin and Lee (2008) also believe that learning processes are participatory and social, supportive of personal life goals and needs.

The concept of studio activity is to allow for interactive participation of students and their peers to discuss and critique their works. In other words, studio teaching is seen as a 'model of interaction', and for 'assimilation of real-life situations'. McLoughlin and Lee (2008:649) envisage:

The affordances of these technologies, coupled with a paradigm of learning focused on knowledge creation and networking, offer the potential for transformational shifts in teaching and learning practices,

whereby learners can access peers, experts, the wider community and digital media in ways that enable reflective, self-directed learning.

2.6 Implications of the review to the current study

The intention of the review was to examine the current development of the graphic design process, using ICT in the ideation process, and the pedagogical paradigms that have informed graphic design education since the introduction of ICT, with respect to the alignment of ideation and ICT in graphic design education. My aim was to show how ICT is aligned with graphic design and what educational paradigms have informed graphic design education in the era of ICT. The review presented a current topology of graphic design, both in the profession and in education, ICT and the pedagogy of graphic design, leading to current educational paradigms that inform ICT in ideation. Ontologically, design is an artistic activity with the application of scientific and technological knowledge. Owing to the complexity of the design process, there are no precise and fixed formulas that bring together form, function, and context; hence pragmatism in terms of epistemological orientation can best be used for such a study.

The literature review has also shown that the graphic design field is much broader now than in the past, and includes disciplines such as motion graphics, environmental commodities, and new media, which were initially not part of the scope of graphic design. Graphic design has evolved from the pre-historic, abstract, geometric shapes, to include a spectrum of ideas for film and TV and all manner of visual communication. It now includes the understanding of human engagement and the efforts of mankind to produce useful and pleasing artefacts.

There was evidence from authors to show that technology has permeated every facet of graphic design—as in its teaching and learning, as well as in the profession. From the review, it has become clear that it is almost impossible now, to talk about graphic design without the use of technological resources, from idea development to final execution of the design solution. There is ample evidence that computer technology has become one of the tools of ideation, in some situations, a ‘thinking tool’. Empirical data reviewed indicate that professional and student designers will rely very heavily upon technological tools and techniques to make sense of their ideation within their respective design tasks.

Throughout the review, it was also evident that the introduction of ICT into graphic design education calls for a review of current pedagogy, especially in respect of ideation. There seem to be tensions and pedagogical imbalances with current pedagogy with regard to ideation. The review has also shown that the graphic design profession somehow influences the pedagogy of graphic design education. Consequently, current educational pedagogy cannot fully rely on the Bauhaus principles that defined the process of design as an object-centred one. Moreover, the current pedagogy that includes the issue of ideation—fundamental to the design process, but still being viewed from the traditional model of professional graphic design—does not accommodate ICT. Educators are encouraged to adopt an educational paradigm that encourages the cognitive learning that comes with ICT, and therefore support a pedagogy that uses technology to facilitate such learning paradigms; paradigms that are underpinned by different principles, based not on the acquisition of isolated facts and knowledge, but on the development of multidisciplinary connections with global networks and participation in communities of practice. These are tied together with reformed educator roles, and greater autonomy and agency for students. In respect of ICT in ideation in graphic design, educators are encouraged to adopt pedagogies that move beyond instruction to those which encourage creativity, innovation and generative thinking (McLoughlin & Lee, 2008:647). Contemporary goals in education, particularly graphic design education, will mean giving students the necessary tools to stimulate their search for creative solutions to problems, as well as a solid scientific basis for decision-making processes, especially in ideation.

Whereas the review discusses many important and relevant aspects of ICT and design education—both in design in general and graphic design in particular, there are no existing studies in the context of developing countries, especially in the African context. Another area in which research literature was deficient was ideation with ICT. The closest was Yeoh's (2002) study, which investigated the impact of computer technology on the design process of ideation in undergraduate graphic design students, and that of Thorsteinsson et al. (2010) that described a specific Virtual Reality Learning Environment (VRLE) technology, established as a tool to facilitate ideation and host online Innovation Education (IE) materials in order to facilitate the innovation process (Thorsteinsson et al., 2010). Yeoh's (2002) study conducted in the US alludes to the fact that: (a) computer technology has been 'accepted' as part of the pedagogy of graphic design in the US; and (b) computer

technology inspires and develops new applications in its users, citing the computer as an 'actual intelligence' for augmenting human problem solving (Yeoh, 2002:222). The study by Thorsteinsson et al. (2010) supports the use of ICT for ideation, but does not discuss ideation in graphic design. My study is planned to target what is actually happening in the teaching and learning of graphic design at a university in a developing country, where ICT, and specifically computer technology, is seen as 'unacceptable' in the pedagogy of the ideation process. I believe that as developing countries also embrace these technologies as a way of coping with issues in teaching and learning, a shift in educational skills and methods is now more important than ever before.

Stones and Cassidy (2010) are emphatic that the tool choice can have an impact on design thinking and thus make a case for the two areas becoming more strongly pedagogically linked at module level. Stones and Cassidy (2010) support the idea that a review of pedagogy in design education therefore should strongly feature in current graphic design educational curricula. This also was informed by their study in the developed economy.

Pedagogy in graphic design should not be an exception, especially in the ideation process in design. Since technological developments are also taking place in developing countries, there is the need to investigate what is happening in the educational world. My study is a contribution to the quest for a clearer pedagogy, especially in respect of developing economies. The review has buttressed that an exploration of these issues of how graphic design education is affected in the era of ICT, together with the principles of design, will greatly help to answer the following:

- What happens to the teaching and learning of ideation in graphic design when students begin to use ICT in direct contrast to traditional graphic design pedagogy?
- How do ICT methods affect the pedagogy of graphic design in a developing economy?

Such exploratory activity can be achieved within the right and appropriate framework for the research—activity-oriented frameworks that relate to graphic design and will help explain the tensions and pedagogical imbalances.

CHAPTER THREE

THEORETICAL FRAMEWORK

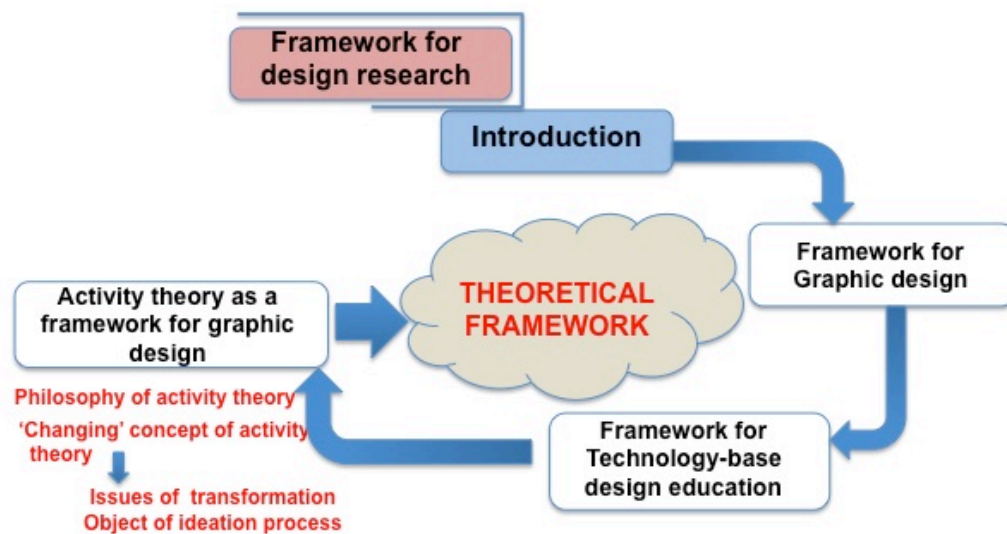


Figure 3.1: Diagrammatic approach of the framework for design research

3 Introduction

Davis (2008) makes a case for research in design education (which includes graphic design), when he argues that the demands on design practice in the twenty-first century are significantly different from those of the past, suggesting that current paradigms may require re-examination. A number of current trends challenge the traditional notions of what educators do and, more importantly what educators need to know with paradigms that require re-examination as far as design education is concern (Davis, 2008:72).

Under ‘Technological expansion and media convergence’ paradigm, Davies (2008:73) believes that:

We now live in a culture of emergent, convergent, sensor, and mobile technology. Traditional object-driven design paradigms, which often result in fixed features and physical attributes, fall short in an experience-oriented world. Networks, tools, platforms, and systems – the means through which people create experience and shape behaviour – are the “products” of design efforts in a vastly reconfigured technological

world. Not only does this shift in the output of design challenge the traditional body of knowledge that informs our design decisions, but it also points to a need for research into the very methods by which we design.

While graphic design currently involves all aspects of media and technology, the way of research into graphic design has not been anything different from traditional paradigm in research.

Generally, research in graphic design is limited. When it comes to theoretical research on graphic design, there seems not to be enough too. Yeoh (2002:37) however, argues that textbooks for graphic design courses no longer rely on research or theories developed by scholars outside the design field, since it is now a substantive field in its own right, with enough bases of knowledge, theories, and research to support from within.

Even though design encompasses a wide range of disciplines depending on the levels or types of tasks in question, design research rests on a concept of design. Recounting design related research in a wide range of journals about a decade ago, Cross (1999:5) remarked that 'design research is alive and well, and living in an increasing number of places'. His concern however was the fact that those researches from the journals draw upon scholarship paradigms from the sciences or the arts.

Our concern in design research has to be the development, articulation and communication of design knowledge. Our axiom has to be that there are forms of knowledge peculiar to the awareness and ability of a designer, just as the other intellectual cultures in the sciences and the arts concentrate on the forms of knowledge peculiar to the scientist or the artist'(Cross 1999:5).

Design projects around that time and still, had become increasingly multi-disciplinary in their stimulation of discussion and debate in fields such as business, ethics, philosophy, political science, ICT, life sciences and biology.

Cross (1999) raised concern about design research, which he believed was a new research field, adding the tendency for researchers in using non-design disciplines,

importing methods, researches and approaches that are inappropriate to developing the understanding of design (Cross, 1999:9). This study share in Cross (1999) belief that design knowledge resides firstly in **people** - in designers especially, but also in everyone to some extent; secondly, in its **processes** - in the tactics and strategies of designing; and thirdly, that design knowledge **resides in themselves** - in the forms and materials and finishes which products embody design attributes. Based on these convictions, Cross (1999:10) later proposes an appropriate paradigm for design theory.

In proposing 'Designerly ways of knowing', Cross (2001:54) remarks:

Design as a discipline, therefore, can mean design studied on its own terms, and within its own rigorous culture. It can mean a science of design based on the reflective practice of design: design as a discipline, but not design as a science. This discipline seeks to develop domain-independent approaches to theory and research in design. The underlying axiom of this discipline is that there are forms of knowledge special to the awareness and ability of a designer, independent of the different professional domains of design practice.

The process of design is mostly characterised by events that seems not to follow set patterns and direction. The so-called 'creative leap' makes it difficult to decide the set pattern that will produce the 'required answers' (Dorst & Cross, 2001). But research policies require that defined steps and methods be followed in unearthing the solution one envisages.

Contributing to the discussion on the nature of design research, Collins, Joseph, and Bielaczyc (2004) trace the genesis of design research from Ann Brown (1992) which was developed to address several issues central to the study of learning. They include the following:

- The need to address theoretical questions about the nature of learning in context.
- The need for approaches to the study of learning phenomena in the real world rather than the laboratory.
- The need to go beyond narrow measures of learning.
- The need to derive research findings from formative evaluation (Collins et al., 2004).

They lamented some difficulties within these paradigms and outlined some serious

challenges which include:

- Difficulties arising from the complexity of real-world situations and their resistance to experimental control;
- Large amounts of data arising from a need to combine ethnographic and quantitative analysis; and
- Comparing across designs.

Currently, it is not uncommon to see design research being characterised by both integrating and creating collaboration between the methods and theories of multiple disciplines. They often include disciplines that may seem only remotely related when seen through the lens of classic academic history, such as the technical sciences, the humanities and sociology (Collins et al., 2004:3). Design research has also been categorised by three models. The first layer concerns the disciplines that carry out design research; which are anchored in the schools and academies of design and architecture, the technical disciplines, including engineering, material technology, computer science, software development etc., the mercantile disciplines, including marketing, consumer studies etc., the humanities, including design studies from the perspective of art history. The second layer of the model presents the key positions within design research and they often involve several disciplines. These are labelled Design Methods, Design Studies, Design Management, Interaction Design and User Studies, Science and Technology Studies (STS), Marketing and Product Adaptation, Consumer Culture Studies, Brand and Brand Management, Material Culture Studies and Culture Studies. The third layer describes some of the mind-sets – directions or paradigms within philosophy and within theory of science – that have influenced design studies in recent times, from positivism over semiotics and structuralism to phenomenology, post-structuralism and constructivism (Anon n.d.).

I find my study leaning towards the third layer as it explores the issue of a phenomenon – students' use of ICT in ideation that is fundamentally against the tradition of design pedagogy. However, there are aspects that seek to adopt segments of each of the first layer - looking at the pedagogy of design education: and that of understanding issues of graphic design studies that lean towards the second layer. Hence the adoption of a pragmatism in its orientation

Exploring pedagogical issues in ideation with the introduction of ICT will mean trying to investigate a phenomenon that seems to be emerging within the educational

system. Such an interpretive study may require a pragmatist framework.

3.1 Framework for graphic design

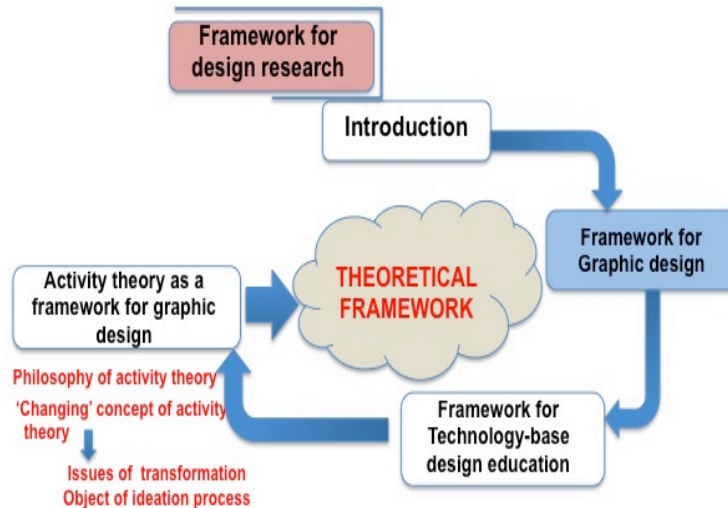


Figure 3.2: Diagrammatic approach of the framework for graphic design

In his ‘study on the influences of computer usage on idea formation in graphic design students’, Yeoh (2002) discusses three relevant theoretical fields that framed his study. These are market-driven framework, graphic design processes and theories and models of creativity.

Under graphic design process framework, Yeoh places great emphasis of visual exploration in ideation by designers because ideation is considered to be an essential part of the design process and discuss sketching in ideation as that which materializes the content of an image and is importantly linked to the formation of images (Yeoh, 2002:69). Through sketching, ideation can be reinterpreted and this creates many opportunities for explorations and also an important tool for understanding and discovering design paradigms.

Design paradigms can act as powerful tools for creating new designs since they encourage interactivity, negotiation, and communication between art directors, other designers in a design studio as well as designers and their clients. By exploring new paradigms and applying learned paradigms, designers learn what works and what does not (Yeoh, 2002:69).

In theories and models of creativity framework, one describes how creativity is intertwined in the design process and that it becomes important to describe the concepts, approaches, phases, and methods rather than creativity all by itself. This study is concentrated on graphic design methods, technology associated with the field, and design pedagogical perspectives more than any other, but all the perspectives add important dimensions to the concept. The three models - market-driven framework, graphic design processes and theories and models of creativity - by Yeoh (2002), are lengthy partly due to the fact that they intend to illustrate the complexity and diverse body of knowledge available. Tan and Melles (2010:462) believe that graphic design is made up of complexities. It employs a range of symbolic and material resources through the conceptual design phase as well as commercial and professional pressures. Such complexities require a framework that will be able to capture all the process and stages for analysis. Moreover, graphic design education now involves the use of technologies – both information and communication.

3.2 Framework for technology-based design studio

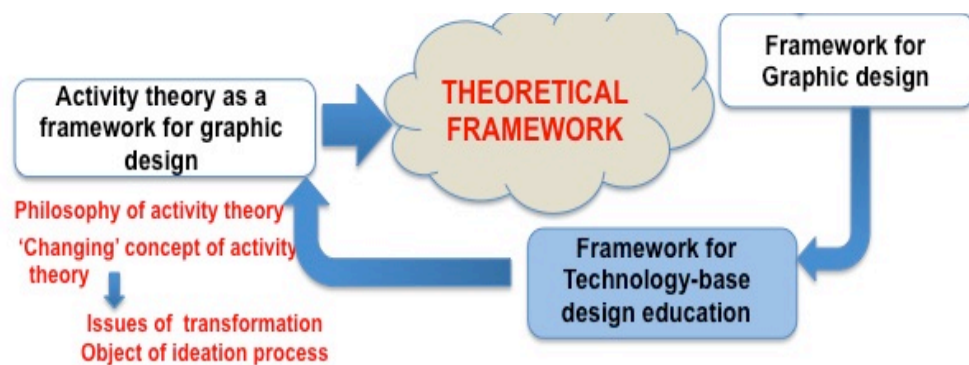


Figure 3.3: Diagrammatic approach of the review: framework for technology-base design education

Sagun et al. (2001) make a case for a framework for web-based education that is applicable to technology-based design education. It is based on the fact that design education involves lecture and studio teaching together to engage students with design knowledge, skills and practice (Sagun et al., 2001:335). The framework considered pedagogical, ideological and epistemological levels relating to design education which include studio approach, tools mediated systems and outcome-based results.

The first step of the framework looks at the objectives (why); the methodology and management issues, the question of 'why' a web-based system is preferred to traditional design system. The next step is for practical issues: that Web-based education can be practiced in either as a support to the existing traditional teaching methods or replacement of the existing method completely. It looks at the major implications for the design and delivery of web-based education and for the study requirements of the learner. It also captures tools ranging from simple programmes to large expensive software packages that can be used for such programme or course. Furthermore, the framework encourages pragmatism in its involvement with students finding meaning in their own meanings in the studies.

This study follows a pragmatist but interpretive approach that seeks to explore pedagogical issues. It does not require methodology that seeks to inquire why ICT is being engaged in the ideation phase. Rather, the study is engaged in looking at complexities that has evolved since the introduction of ICT into the teaching and learning of ideation in graphic design. In comparison to other frameworks Tan and Melles (2010) advocated for activity theory for graphic design, citing numerous advantages with activity theory.

3.3 Activity theory as a framework for graphic design

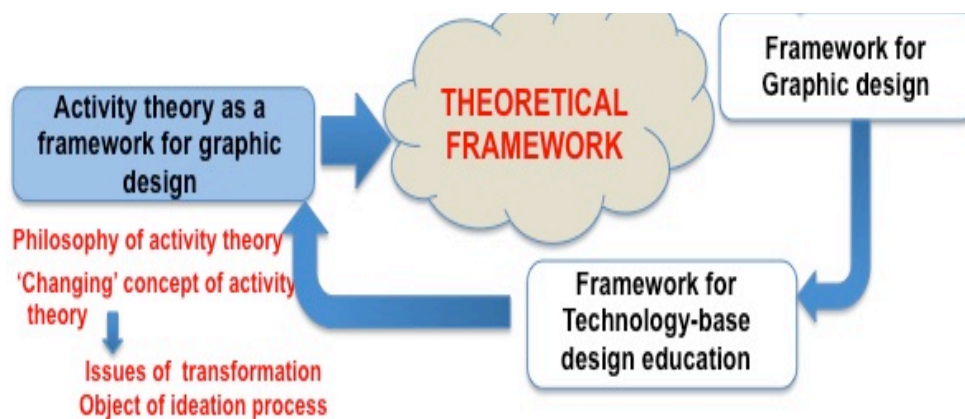


Figure 3.4: Diagrammatic approach of activity theory as a framework

The framework for this research rests on the use of Activity Theory (AT) as a theoretical lens in analysing ideation in graphic design. Epistemologically, the study adopts interpretivist orientation, which is often combined with social constructivism, allow the researcher to the researcher to look for complexity of views rather than few narrow ideas (Creswell, 2007:20). It is therefore exploratory in nature; exploring the

activity between students and their use of tools mediated systems in their ideation process for an outcome. According to Tan and Melles (2010) using activity theory in such an exploratory study will help in understanding the complex and intriguing aspect in the field of ideation (Tan & Melles, 2010:2). It is aimed at trying to answer the research problem of what is happening and how the introduction of ICT in graphic design education is affecting the teaching and learning process of ideation.

As a model for analysis of tool-mediated professional and everyday practice, AT offers a potential framework for such an analysis (Tan & Melles, 2010:3). Tan and Melles (2010:12) made a case for activity theory in graphic design research with the following statement:

Activity theory as a framework provides a model that is appropriately oriented towards qualitatively focused studies of real-world practice, where the concern is to achieve depth of data rather than large sample sizes... Furthermore, activity theory provides a diagrammatic, theoretically informed depiction of the interactive interdependencies between stages of design and problem solving. Finally, the language of activity theory is also flexible enough to describe a wide range of activities and to differentiate specific types of actions, without prescribing overly rigid definitions of either those actions or the overall activities.

Justifying the use of activity theory in their research into graphic design, Tan and Melles (2010) considered three areas that made explicit, the grounds for its applicability. These are:

- its applicability to the complexities of the observed world;
- its utility when considering ethnographic data collection methods; and
- its avoidance of objectification in the analyst account (Tan & Melles, 2010: 463).

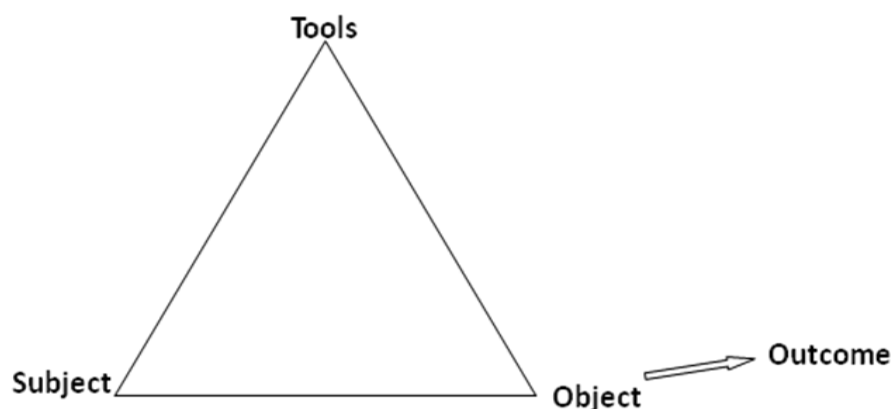
The complexities of graphic design education stems from the use of tools and strategies, no matter how 'unrefined' they may be, to reach a defined objective in the contemporary world of design. It involves a range of personal decision-making, design and creative activities, together with the use of preferred tools and strategies (Tan & Melles, 2010:462).

Graphic design is also based on educational research with ICT intervention, learning theories and ICT in learning as cognitive. Activity theory is being employed to

explore the tensions and experiences of everyday activity of the students and the lecturers of graphic design as they interact with ICT in their ideation process. This seems to be a complex situation since the teaching of the ideation process was conceived in an *un-ICT* platform but is currently being grapple with the use of ICT. There is therefore the need to first establish whether truly ICT is creating such tensions as in the activity of teaching and leaning, and thereby continue to look at the implications and role such tensions are informing current pedagogical imbalance.

7.3.1 Philosophy of Activity Theory

People meet social needs by working and learning over time to achieve particular goals or to act on particular motives. To facilitate their activities, they also develop systems and use tools. These tools include not only things like hammers or computers, but software and ideas. As people refine their tools and add new ones to



solve problems more effectively, the activities they perform using those tools can change—and vice versa: as their activities change, people use their tools differently and modify their tools to meet their changing needs. Activity theory, which has its roots in Russia in the early 20th century, was originally a psychological theory that sees all aspects of activity as shaped over time by people’s social interactions with one another and the tools they use (Kain & Wardle, n.d.:2).

Figure 3.5: Diagram of Activity theory (Vygotsky, 1978)

Unpacking Activity Theory (AT) reveals a psychological meta-theory, paradigm, or theoretical framework, which seeks to understand human activities as complex, socially situated phenomena and beyond paradigms of cognition, psychoanalysis and behaviourism. The philosophical roots of activity theory originated from Karl

Marx's works, whose concept of labour and production of use value was the 'paradigmatic model of human object-oriented activity' for Leont'ev's concept of activity (Engeström et al., 1999:3). Vygotsky earlier had introduced the unit of analysis of object-oriented action mediated by cultural tools and signs (Fig. 3.5) (Vygotsky, 1978:40). Interestingly, the theory of mediation by other human beings and social relations had not come up in Vygotsky's triangle until Leont'ev introduced the concept of the division of labour; a resultant from his human object-oriented activity. Engestrom (1987) later modified his own version by introducing another dimension – a community - that brings into focus two new relationships: rules mediating between the subject and the community and division of labour, mediating between the object and the community (Figure 3.6). Jonassen & Rohrer-Murphy, (1999: 62) believes that activity theory therefore can be used as 'a powerful socio-cultural and socio-historical lens through which we can analyse most forms of human activity', focusing on the interaction of human activity and consciousness within its relevant environmental context.

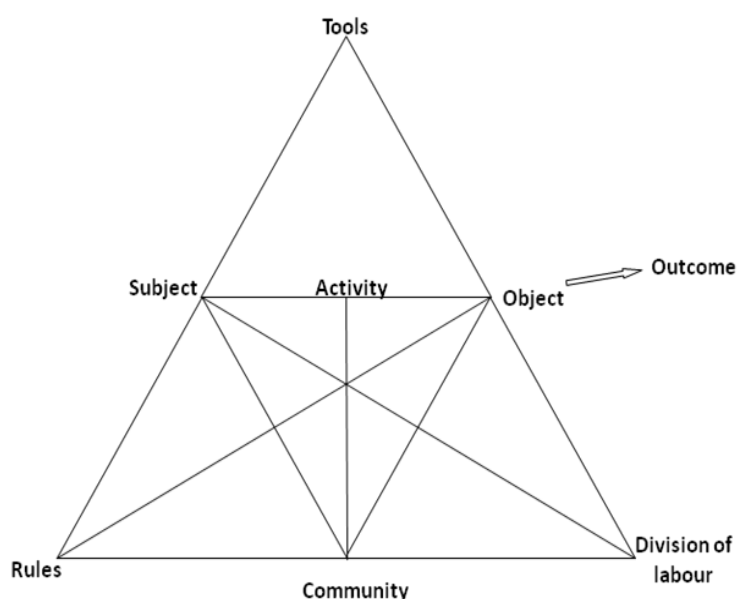


Figure 3.6: Activity theory diagram as expanded by Engeström (1987)

Jonassen & Rohrer-Murphy (1999) again argue that 'activity cannot be understood or analysed outside the context in which it occurs'. They therefore advocate that in examining human activity, one must 'examine not only the kinds of activities that people engage in but also who is engaging in that activity, what their goals and intentions are, what objects or products result from the activity, the rules and norms that circumscribe that activity, and the larger community in which the activity occurs'.

For Kaptelinin and Nardi (2006b:31), 'activity theory is an approach ... that aims to understand individual human beings, as well as the social entities they compose, in their natural everyday life circumstances, through an analysis of the genesis, structure, and processes of their activities'. Quoting Leont'ev (1978), they argue that the concept of activity is therefore the most fundamental concept in activity theory. Activity in general, do not only focus on human activity, but activity of any subject; where it is understood as a purposeful interaction of the subject with the world, a process in which mutual transformations between the poles of 'subject-object' are accomplished (Kaptelinin & Nardi, 2006b:31).

Kuuti (1996:25) believes that activity theory provides a philosophical and cross-disciplinary framework for studying different forms of human practices as development processes, with both individual and social levels interlinked at the same time. Activity Theory further emphasised that our actions derive their meaning from context and therefore our actions should be viewed within a context (Mlitwa & Belle, 2010). According to Kuuti (1996), activities are longer-term formations; their objects are transformed into outcomes not at once but through a process that typically consists of several steps. Looking through activity theory, we can say that actions are directed at specific conscious goals (Bottino et al., 1999) and as such, actions can be understood within the framework of the activity. The study poses the following sub-questions:

- How do graphic design students and educators perceive ICT in the pedagogy of ideation in graphic design?
- What informs the use of ICT by graphic design students in their ideation process?
- How does the introduction of ICT affect the teaching and learning of the ideation process in graphic design, especially in the modern studio?

With the introduction of information and communication technology, computer technology has become a 'thinking tool' (Yeoh, 2002) for ideation, and is 'used for representing both action and thinking' (Jonson, 2005). According to Kaptelinin and Nardi (2006), activity theory is seen as an approach to the investigation of information technologies in the context of human practice (Kaptelinin & Nardi, 2006:3). Technology is 'one in which people act intentionally in specific ways with technology – ways that we can study and for which we can produce effective

designs' (Kaptelinin & Nardi, 2006:3). Kaptelinin and Nardi (2006) writing on interactive design and its relation to activity theory declare that, activity theory fits the general trend in interaction design toward moving out from the computer as the focus of interest to understanding technology as part of the larger scope of human activities. To Kaptelin and Nardi, interaction design comprises all efforts to understand human engagement with digital technology and all efforts to use that knowledge to design more useful and pleasing artefacts (Kaptelinin & Nardi, 2006:5). If ideation involves the mind acting in consonant with the environment or tools for 'generating, developing and communicating ideas, be it visual, concrete or abstract', then activity theory can be used to understand how learners are using computer technology for ideation in graphic design education. Moreover, according to Hasirci and Demirkan (2007), graphic design uses mental imagery, systems and environmental ideas to add value to reach the desired result (Stones & Cassidy, 2007).

Such mental imagery means the tendency of designers to focus on what works, as far as the mind is concerned and thereby reduce the 'laid down systems' to the background. Boling and Smith (2005), quoting Scrivener (1990) in their discussions on the position of mental imagery with sketching agree that "there is objective evidence that spatially depictive images generated from memory have many of the properties needed to explain the ability of artists and designers to generate, manipulate, combine and inspect in imagination non-existent visual objects". What this means is that, even when technology is being pushed for ideation, it does not rule out the mental imagery involved in the processes of ideation. However, such activity could possibly - or not in projecting the disorientation of the process of ideation, creating complexities that seems to link the whole pedagogy of ideation.

According to Brown (2008) some of the complexities that involve the process of idea development in solving design problems arise because, design is not just coming out with a product, but also ideas, services and systems, focusing more on the processes rather than the product. Activity theory takes into account the complexities of the observed world in graphic design (Tan & Melles, 2010), and has been used in analysing technology in higher education (Issroff & Scanlon, 2002), designing constructivist learning environment (Jonassen & Ronrer-Murphy, 1999) and conceptual designing in graphic design (Tan & Melles, 2010). While we are engaged in the discussions of what students are doing in their ideation process, it is

also important to explore their intentions and the circumstances that ascribe the ideation activity within the larger community of the design profession.

One of the assumptions of activity theory is the mind in context. Jonassen and Ronrer-Murphy (1999), in their discussions on 'Activity Theory as a Framework for Designing Constructivist Learning Environments', make the assertion that, 'activities are the human interactions with the objective world and the conscious activities that are a part of those interactions'. Rather than learning before acting, as traditional theories prescribe, they see activity theory as 'a priori that the human mind emerges and exists as a special component of interactions with the environment, so activity (sensory, mental, and physical) is a precursor to learning' (Jonassen & Ronrer-Murphy, 1999:66). They went further to argue that the 'activity and consciousness co-exist since the mind and body (mental and physical) are interrelated' and that 'knowing can only be interpreted in the context of doing'. In the light of this, a change in doing will mean knowledge learnt that is being reflected in a new way by a new method of a learning outcome, since learning and doing are inseparable, according to activity theory. In ideation, it can be argued that, whilst the mind is focusing on trying to solve a design problem, it can only be interpreted when the idea burst out unto captured on the substrate, be it off-screen sketch book or on the monitor of the computer.

In this study, and as indicated in Figure 3:7, the subject is a group of design learners/students (group/individuals), whose objective is to produce creative designs (videos/photographs/drawings/animations) that will communicate ideas or message according to briefs (outcome). The mediating tool or artefact is the ICT tool, made up of computers/world wide web/cameras/videos, which have been dominating graphic design profession currently. The main activity of exploration is the issue of ideation, which is fundamental to design process. Ideation in this context will include (but not limited to) 'the process of generating, developing, and testing ideas that may lead to solutions' (Brown, 2008:4); students' ability to conceive a plan for a particular purpose or effect (Yeoh, 2002:71). Student designers' main objective of producing a design piece which will result in any creative work will involve the combination of how they use the available tools. However, the success of such an outcome will also have an indirect influence on how it is being engaged by the community of practice (involving studio activities, peer critiques at juries, software application, educators' feedback and comments inside and outside the studios and professionals influences

outside the learning environment). The principles associated with design and instructors' interaction (educators acting as their instructors, group members, in situations of group works,) will contribute to the whole process of ideation since activity theory 'facilitates the consideration of interaction in social contexts which is a good starting point for studying contextually embedded practice' (Issroff & Scanlon, 2002:79). Figure 3.7 is a diagram that gives a graphical presentation of the framework of the theory, as it relates to the study (Appiah & Cronjé, 2013).

Such interaction actually will engage in a series of transformation of thoughts, ideas and visuals. Significantly, such transformation will unconsciously be realised after the whole process of ideation that will lead to the object and its outcome. The relationship of the designer and the world around him in executing the task is essentially a societal activity and this is supported by the activity theory (Tolman, 1999:70). As a graphic design educator, there is a presumption of students, sidestepping the ideation process in presenting their creative works. This presumption could be as a result of large class size and unavailability of studio space to accommodate this number, even though virtual design studios have been advocated more than a decade ago (Kvan 2001; Wallis et al. 2010). ICT may be the mediator that could bring students and lecturers to the issue of ideation in order to achieve the desired outcome in graphic design.

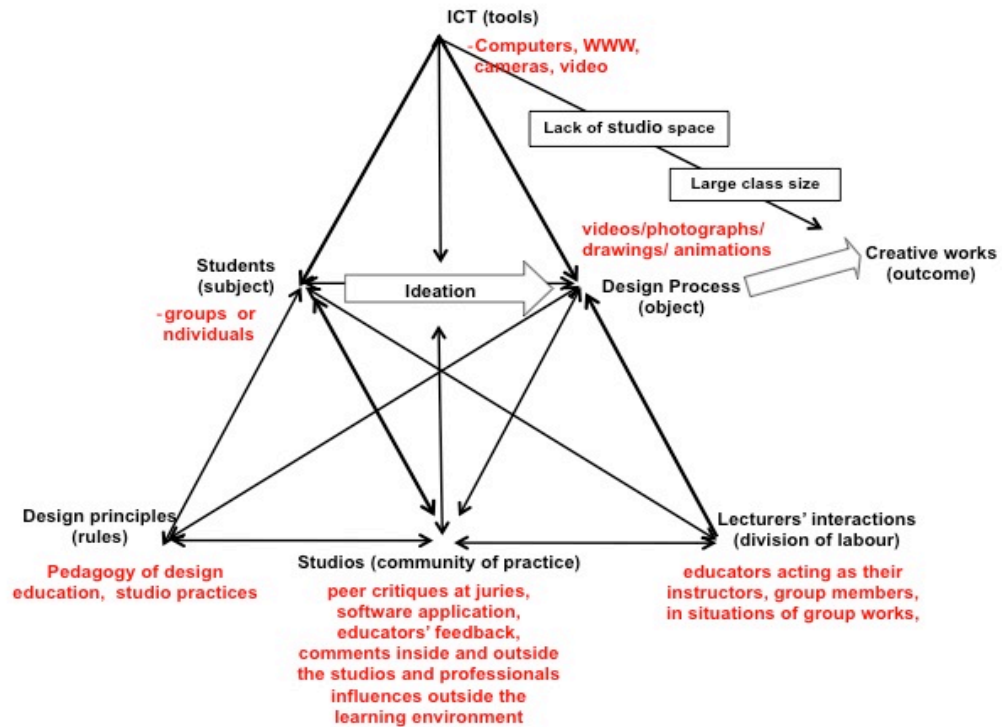


Figure 3.7: Framework of the study indicating the hypothesis with 'large class size' and 'lack of studio space' (Appiah & Cronjé, 2012)

Tan and Melles (2010), in using activity theory to investigate the problem-solving process of graphic design practice, were of the view that, activity theory provided 'a model that is appropriately oriented towards qualitatively focused studies of real-world practice, where the concern is to achieve depth of data rather than large sample sizes' (Tan & Melles, 2010:12). However, in the reality of the learners' studio, students will have to make informed decisions after briefs, so as to know and understand what methods of ideas that will make meaningful, the issue of ideation, for reaching their outcomes. One should point out that Tan and Melles' (2010:12) model was not strong enough 'in distinguishing detailed descriptions of an individual's workflow'. This was partly because their study had chosen to focus on individual designers who had little outside interactions with third parties, and whose activities were intensely iterative and focused on a single motive of design solution for client presentation. It therefore meant that the socio-cultural aspect remained unanswered. In ideation, the brainstorming process can include a myriad of available tools, images and sketches that sometimes might not require definite steps of progressions. Activity Theory borders on actions undertaken by subjects while

interacting with tools and their environment (Nardi, 1996). And since the process of ideation involve brainstorming, organising, sketching, thinking and imagining with the view of creating new ideas, the process will loop back more than once.

In conclusion, the literature supports the fact that ICT has impacted on the issue of pedagogy of ideation in graphic design. How it is impacting, especially in the developing world, is what the study is exploring. Advocating the use of AT in the ideation process will mean examining 'not only the kinds of activities that learners and educators engage in but also who is engaging in what activity, what their goals and intentions are, what objects or products result from the activity, the rules and norms that circumscribe that activity, and the larger community in which the activity occurs' (Jonassen & Ronrer-Murphy, 1999:62). This will help in answering first, the main research questions:

- *What happens to the teaching and learning of ideation in graphic design when students begin to use ICT in direct contrast to traditional graphic design pedagogy?*
- *How do the ICT methods affect the pedagogy of graphic design in a developing economy?;*
and the research sub-questions:
 - *What are the perceptions of ICT by design educators in the current design learning and pedagogy?*
 - *What are the perceptions of ICT by students in the current graphic design pedagogy?*
 - *What are the features of graphic design with ICT in ideation?*
 - *How do the features of ideation relate to graphic design with ICT?*
 - *What are the purposes of ICT in the modern studio and how do they feature in the ideation process?*

These questions will be answered with the appropriate methodologies using Activity Theory. The aim is to try to solve the research problem of how the introduction of ICT in graphic design education affects the teaching and learning process of ideation. As a model for analysis of tool-mediated professional and everyday practice, Activity Theory offers a potential framework for such an analysis. Activity Theory also appears to have certain advantages for analysing situated graphic design practices, as in the current study.

7.3.2 'Changing' concept of AT

A 'hidden' concept of Activity Theory is the changing of circumstances and human activity called revolutionary practice (Marx & Engels, 1968 in Engeström et al., 1999:20), captured by Karl Marx, whose works echoed some of the philosophical roots of Activity Theory. Human beings are bound to change the way they do things as a result of environmental and societal influences, and other interactions. Such changes occur in practice either through consciousness or unconsciousness. Issroff and Scalon (2002) believe that activities cannot be isolated as units.

Activities are not isolated units, but nodes in crossing hierarchies and networks influenced by other activities. Contradictions are central to the theory and exist when external influences change elements of activities causing imbalances between them. For example, a contradiction could occur when a new tool is introduced into a community that does not have any rules of practice to make effective use of that tool. Contradictions manifest as problems and are a source of development. Activity Systems are almost always in flux as they are in the process of working through contradictions (Issroff & Scanlon 2002:78).

With the introduction of ICT in graphic design education, there are now contradictions as far as the pedagogy of graphic design and studio practices is concerned. The focus of this research is developments that followed the introduction of ICT in graphic design education. These developments provide the substance that activity theory will be used to investigate. I therefore see the use of activity theory in this research as an appropriate framework for analysing ideation in graphic design. The various actors in the framework will, however, need to be subsumed within what pertains in design education pedagogy, in order to properly align with the framework.

3.4.1.1 Issues of transformation in AT

To further understand the theory and its relationship to the ideation process, there is the need to discuss the issue of transformation as one philosophy within activity theory. Within the activity system dwells the process of the subject's trying to meet a 'distant' object. Such directional activity reflects a transformation of ideas and thoughts. In Tan and Melles' (2010) case, two levels of activity were observed: iterative activity patterns during periods of creativity and linear activity patterns during routine processes. All these were the result of mediated tools that were used to reach their objectives and outcomes. Such activity of classical representation of the Activity Theory model presents a situation which 'does not fully explicate the

societal and collaborative nature' of the actions in the activity (Engeström, 1999: 30). And it is to overcome this that Engeström introduced the dimension of community that brings into focus two new relationships: rules mediating between the subject and the community and division of labour, mediating between the object and the community. This echoes many dichotomies in the theory of activity, which my research will try to engage in. They include the following:

Psychic vs object-related activity: Issue of continuity and discontinuity: human activity seems to be 'stopped', while the psychic continues. In the ideation process, the mind keeps working with the design even when there seems not to be 'actual work' going on.

Goal-directed vs object-related: What motivates people in achieving their objectives seems to be the focus of achieving their goal but this eliminates the socio-cultural and motivational basis for achieving the outcome.

Neglect (suppression) of communication and mediation by signs: In the process of ideation as it pertains to the design profession, there is always an engagement of communication relating to subject-subject, subject-object and communicative action-productivity action.

The issue of transformation as reflected in the activity theory is linear. Subjects trying to reach their outcome through the objectives create a linear transformation. Ideation in graphic design does not, however, clearly reflect a linear transformation of ideas and strategies (Cross & Cross 1995; Kruger & Cross, 2006; Tan & Melles; 2010).

In looking at the whole process of ideation from the traditional concept of the design process, one envisages the use of pencil and sketches (tools) to initiate the process of brainstorming. Using the model of Engeström (1998), a student will use the pencil and sketch pad to brainstorm to create an idea (object/objective) for the design process. But this object will need to be assessed and discussed with the educators, peers and even outside professionals (division of labour) in studio sessions where during juries, other students critique and give feedback (community of practice). All these, however, are done within the principles of design and the pedagogy as stated in the teaching of graphic design (rules). Since ideation in graphic design does not clearly reflect a linear transformation of ideas and strategies (Cross & Cross, 1995, Cross, 2001, Kruger & Cross, 2006, Tan & Melles, 2010), but that which can loop

back, we can anticipate the transformation to be cyclical.

Kaptelinin and Nardi writing on Mikhail Basov, a student of Vygotsky in his theory of 'organisational forms' or formal structures in Activity Theory, explain that Basov, in an attempt to go beyond the elementary 'stimulus–response' structure of behaviour, introduced the concept of 'circular' responses, based on an idea similar to the cybernetics notion of the feedback loop (Kaptelinin & Nardi, 2006:175). This 'stimulus-response' structure clearly supports the issue of ideation not being just iterative but also cyclical, in that it clearly loops back and forth in the design process. They also allude to Basov's differentiating three main types of dependencies between components of an action through which the action is implemented. These are:

- no dependency at all (the components can be executed separately from each other);
- chain actions (execution of one component triggers the next one); and
- flexible exploration strategies.

In the design process of ideation, it is quite significant to know that an action initiated to solve one direction of a design problem, literally leads to many actions that somehow taper towards an outcome, as captured in the second type.

Engeström et al. (1999) discuss transformation in relation to **action time and activity time** and explain action time as linear and anticipating termination, while activity time is recurrent and cyclical (Engeström et al., 1999:33). For ideation, activity time is paramount; this research therefore investigates and explores activity time as transformation that is experienced in ideation activity.

In activity theory, one envisages a gap that relates to structure and components, and this has been one of the criticisms of the theory. For example, the structure of the theory does not portray the means of solving a problem. For example, how do we relate activity to thinking, perception, memory, and even feelings? Can thinking, perceptions, memory and feelings be in the design process? Are these behaviours in learning or in drama or theatre captured as activities? Human thinking is thinking activity. Perceptions and thinking help one to solidify ideas into cognitive actions, as in ideation in graphic design, while thinking also plays an active role in the process of studio design.

Next, this study looks at how tools, which can be said to be thinking tools in graphic design, engage students in thinking through the ideation process. Issroff and Scanlon (2002), in discussing the use of technology in higher education from an activity theory perspective, state:

An activity is a form of doing, directed to an object. Activities are distinguished from one another by their objects. An activity is motivated by the need to transform the object into an outcome (an outcome can be a material thing or totally intangible, such as an idea). The object and the motive can change during an activity. The relationship between the subject and the object of activity is mediated by a tool. This tool has the history of the developing relationship and can be either a material object or a tool for thinking.

Kuutti (1996:13) also asserts that:

Activities are not static or rigid entities; they are under continuous change and development. This development is not linear or straightforward but uneven and discontinuous. This means that each activity also has a history of its own. Parts of older phases of activities often stay embedded in them as they develop, and historical analysis of the development is often needed in order to understand the current situation.

What pertains in design education currently can be understood when the tools employed in such activities like ideation are interrogated through a historical analysis. For graphic design, such tools will keep on changing, especially as we embrace information and communication technologies.

Using AT as analysis for activity in ideation, it is possible to agree that, in design development, generation of ideas does not follow any set pattern. Lilien et al. (2002) stress that, in designing new products for the market, 'many firms generate new product ideas based on information collected from current or potential users' (Lilien et al., 2002). Jonson (2005) sees 'design ideation as a matter of generating, developing and communicating ideas where "idea" is understood as a basic element of thought that can be either visual, concrete or abstract' (Jonson, 2005:613). AT 'does not only focus on human activity, but activity of any subject, where it is

understood as a purposeful interaction of the subject with the world' (Kaptelinin & Nardi, 2006:31).

A considerable range of literature on ICT in terms of design and design activities suggests that although ICT can improve learning, there are a number of issues that need to be considered if such technology is going to make a difference (Higgins, 2008). According to Phillips and Gilding (1998), 'we cannot evaluate ICT in isolation—we have to look at student learning in the teaching and learning environment as a whole' (Phillips & Gilding, 1998:1). The success or otherwise of ICT as a tool in graphic design, can only be viewed in the context of the activity being rendered. Being seen as a tool has also initiated the debate of what kind of tool should be ascribed to ICT in design education. This situation highlights the urgent need for curriculum debate, and a review of graphic design's structure, efficiency and effectiveness in the current pedagogy.

'In activity theory, the use of technology is embedded in meaningful context; not limited to information processing; and operative at several levels, which have to be integrated' (Kaptelinin & Nardi, 2006:78). An extension of the scope of analysis and subject matter has been a key theoretical contribution of activity theory as far as Human Computer Interaction (HCI) is concerned. According to Kaptelinin and Nardi (2006), activity theory in the field of HCI is 'understood as dealing with specific meanings and contexts of uses of technology in everyday life. By considering technology as a mediator between human beings and the world, rather than a pole of interaction, activity theory brought to light important new issues' like

- physical aspects (operating with a device as a physical object);
- handling aspects (the logical structure of interaction with the interface); and
- subject–object-directed aspects (how objects 'in the computer' are related to objects in the world)(Kaptelinin & Nardi, 2006:78).

The designer in graphic design does more than use ICT. Designers use ICT as 'not just information-processing devices but rather individuals striving to achieve their goals' through 'their interests, emotions, hopes, passions, fears, and frustrations. These are important and powerful factors in choosing, learning, and using a technology' (Kaptelinin & Nardi, 2006:78).

The mediated areas that link Activity Theory in its implementation are the various networks of activities within ideation. There are those of rules, division of labour and

community of practice, and these must be interrogated within the context of technology use. 'Activity theory provides a coordinated description of the use of technology at several hierarchical levels at the same time, and thus opens up a possibility to combine, or at least coordinate, analyses of different aspects of the use of technology, such as physical interaction, conceptual interaction, and social "contextual" interaction' (Kuutti & Bannon, 1993, in Kaptelinin & Nardi, 2006:78). It is important that such levels and interactions are viewed in relation to the design studio and design principles. These are fundamental issues as far as graphic design education is concerned. The main idea of an object, in this study, however, is that the ideation process will also need to be probed, using AT.

3.4.1.2 Object of ideation process in AT

The idea behind the issue of ideation is to generate, develop and test ideas that may lead to finding a solution to a design problem (Brown, 2008). Thus the object of activity in the process of ideation might lead to a preferred outcome. This may sound somewhat contradictory, since the issue of ideation (which is the main issue of the design process) also becomes an object of activity that speaks to the design process. According to Kaptelinin and Nardi (2006:137):

The prominence of the "object of activity" in the conceptual framework of activity theory is hardly surprising. It appears that much of the theory's appeal lies in its view of subjective and objective phenomena as fundamentally inseparable, and of the object of activity as a crucial link relating them to each other. The object of activity thus has a dual status; it is both a projection of the human mind onto the objective world and a projection of the world onto the mind. ... It changes the theoretical perspective on both the mind and the world. Instead of being a collection of "mental processes," the mind emerges as biased, striving for meaning and value ...

What this means, is that the mind in the design process becomes a collection of mental processes of contextualising, while focusing on the object of its activity in reaching out to its outcome of finding an appropriate solution to the design problem. From the perspective of this research, the concept of the object of ideation becomes an analytical tool providing understanding not only of what is happening with the design process with ICT, but also of why students are doing what they are doing. The object of activity here can also be considered to be 'the "ultimate reason"'

behind various behaviours of individuals, groups, or organisations. In other words, the object of activity is a sense-maker, which gives meaning to and determines the values of various entities and phenomena. Identifying the object of activity and its development over time can serve as a basis for reaching a deeper and more structured understanding of otherwise fragmented pieces of evidence' (Kaptelinin & Nardi, 2006:138).

Research into graphic design education of ideation using AT will therefore call for a study of methods that enhance designers' objectives in the ideation process, in order to infuse the relevant pedagogy into the teaching of the design process. In their discussion, Kowaltowski et al. (2010:474) argue for the inclusion of pedagogy that will give students tools to stimulate the search for creative solutions to problems, as well as offer a solid scientific basis for choosing decision-making processes in the ideation period. According to them,

... design is an artistic activity with the application of scientific and technological knowledge. ... Due to the complexity of the design process there are no precise and fixed formulas that bring together form, function, context conditions and available technologies. With an understanding of first principles, experience and intuition, most designers reach heuristically their design solutions (Kowaltowski et al., 2010:474).

CHAPTER FOUR

RESEARCH DESIGN AND METHODOLOGY

4 Introduction

This chapter outlines the strategy adopted in answering the main research questions:

- What happens to the teaching and learning of ideation in graphic design when students begin to use ICT in direct contrast to traditional graphic design pedagogy?
- How do the ICT methods affect the pedagogy of graphic design in a developing economy?

The chapter opens with the philosophy of the research and also outlines the research design. The specific research methods, research instruments chosen for different phases, data sources, and tools that were used are adumbrated. How data was managed and analysed is also captured. Finally, other matters such as factors that enhanced the study's credibility and trustworthiness are also discussed.

4.1 Research philosophy

Philosophy explains the way things are, with theories that enable one to explain things as they are (Henning et al., 2004:14). In relation to this study, how do we explain the way ICT informs the current graphic design pedagogy in respect of the issue of ideation? This research is an attempt to find out *what* happens with ideation in ICT and *how* it happens that way. It is therefore based on mostly the interpretivistic epistemological orientation. Ontologically, it is mostly constructivist in its orientation, and therefore utilises a qualitative research strategy. The issue of transformation and emancipation within the phenomena being explored, however, positions it as a critical paradigm in terms of philosophy. Viewed from the critical paradigm, it is about how design students have transformed their ideation process with the introduction of ICT and how emancipatory or otherwise such actions are to the mutating pedagogy of graphic design education (Babbie & Mouton, 2001:14). It is also about how graphic design students develop and discover knowledge with ICT in their ideation process, within their environment where the focus shifts from teacher-directed to student-directed learning (Lowerison et al., 2006:467; Wang, 2011:189). Such study requires the formulation of a clear design for the research.

4.2 Research Design

According to Nieuwenhuis (2007), the research design describes the plan or strategy dictated by ‘the underlying philosophical assumptions to specifying the selection of respondents, data gathering techniques to be used and the data analysis to be done’(Nieuwenhuis, 2007b:70). It is the ‘logical blueprint’ that serves as ‘logical’ plans, and involves the links among the research questions, the data to be collected, and the strategies for analysing the data—so that a study’s findings will address the intended research questions (Yin, 2011:75). It also helps to strengthen the validity of a study, including its accuracy by following ‘the logical sequence that connects the empirical data to a study’s initial research questions, and ultimately, to its conclusions’(Yin, 2009:26). In other words, the design choice is informed by the type of research question posed that will generate the required answers to the research. It can also be viewed as the plan that guides the researcher as he/she collects, analyses and interprets the data to achieve the desired results. It is the plan of how one intends conducting the research process in order to solve the research problem (Babbie & Mouton, 2001:647).

My study delves into a new interest—that of students’ using ICT for ideation; this is something which is relatively new in developing countries but which is a persistent phenomenon (Babbie & Mouton, 2001:80). I am interested in who are involved in this phenomenon, how widespread it is, and what support or otherwise is given to ICT in respect of ideation in graphic design within the current pedagogy.

It requires justifiable questions for conducting an exploratory study that will give an insight into the particular case. Yin (2009) proposes that in an exploratory study, any one of a survey, an experiment or a case study method could be employed (Yin, 2009:9), adding that research questions that focus mainly on ‘what’ questions demand an exploratory method of design to ‘develop pertinent hypotheses and propositions for further inquiry’ (Yin, 2009). Babbie and Mouton (2001) hold the view that one of the reasons for an exploratory study is to develop a better understanding of the problem and also to develop new hypotheses about existing phenomena (Babbie & Mouton, 2001:80).

Comparing the case study and survey, Denscombe (2007) believes a case study is more detailed than a survey. In researching just one instance, there is obviously a far greater opportunity to delve into things in more detail and discover things that

might not have become apparent through a more superficial survey.

The case study approach works well ... because it offers more chance than the survey approach of going into sufficient detail to unravel the complexities of a given situation. It can deal with the case as a whole, in its entirety, and thus have some chance of being able to discover how the many parts affect one another. In this respect, case studies tend to be 'holistic' rather than deal with 'isolated factors'. It follows from this that within case studies there is a tendency to emphasize the detailed workings of the relationships and social processes, rather than to restrict attention to the outcomes from these (Denscombe, 2007:36).

4.2.1 Design choice of a case study approach

The choice of my research is a case study, an approach that is preferred when examining contemporary events, especially if the relevant behaviours cannot be manipulated (Yin, 2009:11). It is an empirical inquiry that investigates in depth, within a real-life context, a contemporary phenomenon. This is particularly useful when the boundaries between phenomenon and context are not clearly evident (Yin, 2009:18). A case study is a 'qualitative approach in which the investigator explores a bounded system (a case) over time, through detailed, in-depth collection involving multiple sources of information' (Creswell, 2007:73). It is also about examination of multiple variables and the 'interaction of a unit of study' (Babbie & Mouton, 2001:281). Some of these variables are observations, interviews, audio-visual material, and documents and reports, all focusing on just one instance of the whole that is to be investigated (Denscombe, 2007:35). It is also about 'what' ICT does to ideation in the current face of graphic design education. It focuses on examining contemporary events (Yin, 2009:11) in the teaching and learning of ideation in graphic design. The study therefore considers the following questions:

- What happens to the teaching and learning of ideation in graphic design when students begin to use ICT in direct contrast to traditional graphic design pedagogy?
- How do the ICT methods affect the pedagogy of graphic design in a developing economy?

and the following sub-questions:

- How do graphic design students and educators perceive ICT in the pedagogy of ideation in graphic design?
- What informs the use of ICT by graphic design students in their ideation

process?

- How does the introduction of ICT affect the teaching and learning of the ideation process in graphic design, especially in the modern studio?

It explores the introduction of ICT in the teaching and learning of ideation in graphic design education at a university, and as such favours using the survey method. An investigation of pedagogical concepts (a contemporary event) that have informed graphic design education with the introduction of ICT, however, prompted the use of the case study method as a preferred research choice.

4.2.1.1 Contextual situation

To understand and interpret case studies, Babbie and Mouton (2001) suggest that researchers should explain the context in detail. Rarely will the unit of analysis in a case study be 'isolated from and unaffected by the environment in which it is embedded' (Babbie & Mouton, 2001:282). This helps in the contextual variables that seek to influence the unit of analysis.

The study was conducted in the Department of Communication Design at the Kwame Nkrumah University of Science and Technology (KNUST), Ghana. In *webometrics.com*'s 'Ranking of Universities in Africa' (Webometrics, 2011), KNUST leads science and technology universities in Ghana. The phenomenon is a situation where the introduction of ICT in the curriculum allows students to go through ideation without strict observance of the design process as captured by the design principles according to the Bauhaus. Anecdotal evidence suggests that currently, students think, speak and understand ICT. In the current pedagogy of ideation in graphic design there is, unexpectedly, no place for ICT. With universities in developing countries faced with large class sizes and inadequate studio space, and less student-teacher interaction as per initial evidence, how are students responding to the introduction of ICT? What methodologies are students and educators adopting to overcome these challenges? There is far greater opportunity to delve in more detail and discover significant things about this given situation (Denscombe, 2007:36).

Suffice it to say that developing countries are making attempts to bridge the ICT gap between them and developed economies. This situation gives sufficient reason to explore how ICT changes the teaching and learning of graphic design in respect of

ideation. Ideation therefore becomes the unit of analysis in this research. According to Nieuwenhuis (2007b:75), the unit of analysis is a critical factor in case study research, since it often focuses on a system of action rather than on the individual or group of individuals. For Babbie and Mouton (2001), the defining characteristics of a case study are its emphasis on an individual unit of analysis (Babbie & Mouton, 2001:281). Babbie and Mouton (2001:282) emphasise that the unit of analysis in case studies is rarely isolated from and unaffected by factors in the environment in which it is embedded. Therefore, to understand and interpret this phenomenon, there is the need to explore the context in detail.

Even though the current study examines how ICT impacts on graphic design education, the real focus is about how graphic design students ideate in the era of ICT and computer technology. The unit of analysis, which is the fundamental problem (Yin, 2009:29), therefore is the issue of ideation by design students in the design process. This is a real-life phenomenon that calls for exploration and investigation on how ICT impacts on graphic design education in this community. My study explores the teaching and learning of ideation with ICT, which is not part of the pedagogy of graphic design education in a developing country, and how ICT influences the teaching and learning of graphic design. Although this seems to be a unique case in some respects, it is also a single example of a broader class of events that may be happening in other developing countries, where adoption of ICT in graphic design reflects the status quo. Findings from this case can therefore be applied on the basis that these issues are relevant to developing economies.

This study adopts the activity theory framework as a lens for understanding the context-based investigations of individual and group mediated actions in ideation. This framework was used to focus more intensely on the design process of ideation in graphic design pedagogy in each case. It was the vehicle to generalise the prediction or lead to modification of the theory, which could be practical and not just academic (Yin, 2009:54).

4.2.1.2 Unit of analysis and unit of observation

The unit of analysis is the 'what' of the study; the 'object, phenomenon, entity, process, or event' that is being investigated (Babbie & Mouton, 2001:84). According to Henning et al. (2004), the unit of analysis 'directs the boundaries' of the study, aiming to see the 'patterns, relationship and the dynamics that warrant the inquiry'

(Henning et al., 2004:32). Such 'object' or 'entity' could be an individual, social groups, organisation and institutions or actions.

Since the unit of analysis is typically what the study 'observes' or 'examines', there is the tendency to see it as a unit of observation. Babbie and Mouton (2001), however, make a clear distinction between the two. While looking at the object, phenomenon or entity of inquiry, there is the need to identify the exact detail of the phenomenon on which the actual observation is being conducted. These are things a study examines in order to construct summary descriptions and also to explain differences among them. Such exact details of phenomena are the units of observation (Babbie & Mouton, 2001:85). Researchers should be able to make some distinctions in establishing the unit of observation from the unit of analysis. According to Babbie and Mouton (2001:175), in a situation where units of analysis and observation seem to be the same, it will require 'some ingenuity in collecting data relevant to the unit of analysis without actually observing the units'.

My study explores a phenomenon pertaining to graphic design education in a developing country. It is about how ICT, in the teaching and learning of graphic design, affects ideation. While the study delves into how ICT impacts on ideation, it is about what students do when they are confronted with the problem of finding solutions to their design issues, and lecturers' responses to their ideation. It is about observing the pedagogy of ideation in the studio. Even though the context is a developing country, the study chooses one university and focuses on a specific department. The purpose is to understand what is happening in the world of graphic design education as it embraces ICT in ideation.

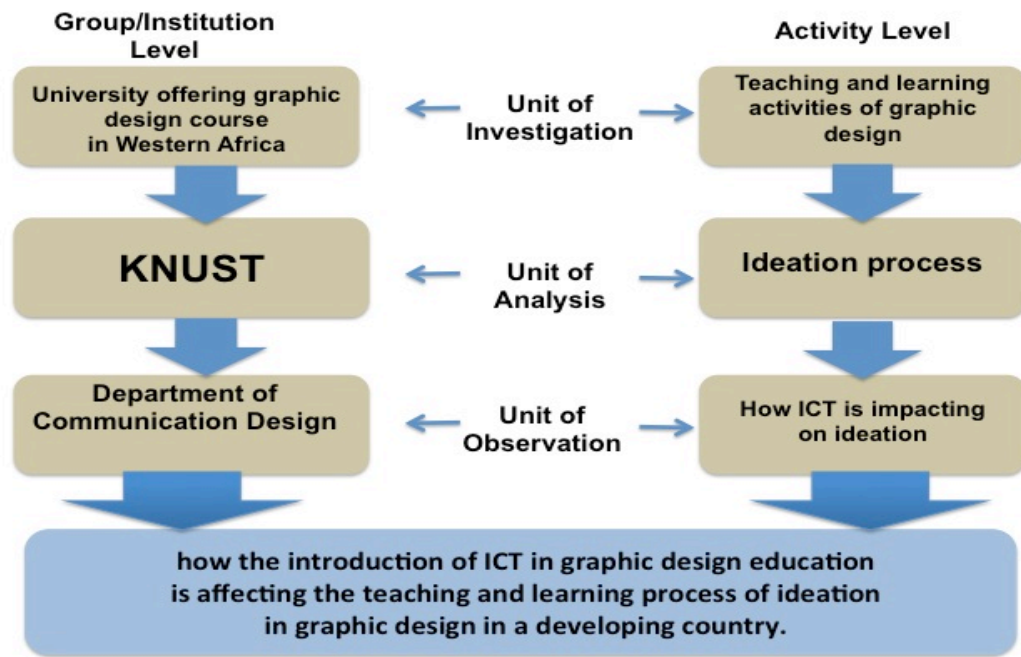


Figure 4.1: Diagram of levels of investigation of the research

4.3 Research methodology

While the research design assumes the ‘blueprint’ of the study and describes the plan or strategy, research methodology refers to ‘methods, techniques, and procedures that are employed in implementing the research design or research plan, as well as the underlying principles and assumptions that underlie their use’ (Babbie & Mouton, 2001:647). It focuses on the processes, the kind of tools and procedures to be used in the study (Babbie & Mouton, 2001:75). It also includes the type of population, measurement, sampling, data collection and analysis that is employed to construct the research design in a particular study. It therefore focuses on the steps as captured in the research design, though not linearly. Nelson (2009) introduces another dimension, which relates especially to creative arts: the bibliographic search. According to Nelson (2009), ‘all the readings that you might do; the titles and choices you have to make on what you want to read; and your preferences and the soundness of the readings to know what to do and when to do what in order to fulfil the research design are all part of the research methodology’ (Nelson, 2009:80).

The study aims for ‘fresh, complex, rich descriptions of a phenomenon as it is

concretely lived’ and therefore requires research methods ‘that are responsive to both the phenomenon and the subjective interconnection between the researcher and the researched’ (Finlay, 2009:7). From a pragmatist paradigm view, the theory allows for the freedom to choose methods, techniques and procedures that seek answers to the research questions in the study. This current study adopted the multi-method approach (also referred to as combined methods research) of both qualitative and quantitative methodology. As a multi-method approach, the quantitative methodology allowed for the broad trends of ICT usage in the student population (numbers), the attitude and perceptions of participants towards the use of ICT in ideation in graphic design. Moreover, the experiences of students and lecturers in in-depth interviews and observations about individual perspectives on ideation in graphic design (Ivankova et al., 2007:262) also emerged. The choice of a combined method was informed by the research questions:

- What happens to the teaching and learning of ideation in graphic design when students begin to use ICT in direct contrast to traditional graphic design pedagogy?
- How do the ICT methods affect the pedagogy of graphic design in a developing economy?

4.3.1 A case for qualitative inquiry

‘Qualitative studies aim for depth rather than quantity of understanding’ (Henning et al., 2004:3). Sullivan (2010:97) remarks that,

if a primary purpose of research is to increase awareness of ourselves and the world we live in, then it seems plausible to argue that understanding is a viable outcome of inquiry. The possibility of gaining new understanding involves investigating issues that have personal and public relevance ... If a goal of any inquiry is to be able to act on the knowledge gained, then it is reasonable to expect that understanding is as significant as explanation as an outcome of research.

Gaining understanding requires a massive inquiry in which the qualities, characteristics or properties of a phenomenon are examined for better appreciation and explanation (Henning et al., 2004:6).

In gaining an understanding of a phenomenon, Henning et al. (2004:6) again believe that:

a thick description gives an account of the phenomenon that is (a)

coherent and that (b) gives more than facts and empirical content, but that also (c) interprets the information in the light of other empirical information in the same study, as well as from the basis of a theoretical framework that locates the study.

According to Nieuwenhuis (2007a:51),

Qualitative research is concerned with understanding the processes and the social and cultural contexts which underlie various behavioural patterns and is mostly concerned with exploring the “why” question ... focuses on describing and understanding phenomena within their natural occurring context ... with the intention of developing an understanding of the meaning(s) imparted by the respondents.

Qualitative research therefore involves careful observation of participants (often including interactions with participants), usually accompanied by extensive notes (Gravetter & Forzano, 2009:147). It primarily works within the constructivist paradigm, is principally interested in narrative data (Teddlie & Tashakkori, 2009:4), and is associated with gathering, analysis, interpretation and presentation of narrative information (Teddlie & Tashakkori, 2009:6). The study is about how specific pedagogical bearings influence graphic design education in the area of ideation in this era of ICT. Issues of personal and public relevance shaped this research study, hence the adoption of qualitative inquiry for an interpretive epistemology.

4.3.2 A case for quantitative inquiry

Even though the research is based on the interpretive epistemology, there is the need to establish whether ICT is truly used in the teaching and learning process of ideation in graphic design. The issue of examining variables that typically vary in quantity (size, magnitude, duration or amount) is also important in this study. As Gravetter and Forzano (2009) remark, quantitative research is based on measuring variables for individual participants to obtain scores, usually numerical values, that can be summarised, analysed and interpreted using standard statistical processes (Gravetter & Forzano, 2009:147). Such interest in numerical data and analysis rests within the post-positivist/positivist paradigm (Teddlie & Tashakkori, 2009:4).

According to Maree and Pietersen (2007:145) quantitative research is also ‘a process that is systematic and objective in its ways of using numerical data from only a selected subgroup [a selected year group of designers in a particular university] or population to generalise the findings to the universe that is being studied’. A combination of interest in both narrative and numeric data therefore positions the study within a pragmatist paradigm, resulting in a mixed methodologist working area, which is also referred to as the third path (Gorard & Taylor, 2004) or the third research paradigm (Johnson & Onwuegbuzie, 2004).

In this current study I am interested in ascertaining answers to the following:

- What happens to the teaching and learning of ideation in graphic design when students begin to use ICT in direct contrast to traditional graphic design pedagogy? (One of the main questions.)
- How do graphic design students and educators perceive ICT in the pedagogy of ideation in graphic design?
- What informs the use of ICT by graphic design students in their ideation process? (Sub-questions.)

These issues call for quantification of constructs as a way of measuring the phenomena (i.e., the attitudes of individuals towards the use of ICT in ideation). This can only be done by assigning numbers to the perceived qualities of things (Babbie & Mouton, 2001:49).

4.3.3 A case for a multi-method approach

The current study adopted a multi-method approach (Denscombe, 2007:107), also called mixed research (Onwuegbuzie & Johnson, 2006), in an effort to take advantage of the similarities and differences in qualitative and quantitative methods as in its pragmatic view (Yin, 2011:289). Even though the quantitative method differs from qualitative research in how they ascertain information and the questions they seek to address, they can both be applied to one study and the same research problem (Ivankova et al., 2007:261). Ivankova et al. (2007:261) make a case for mixed methods in the following statement:

By using a quantitative approach we look for relationships between the variables, while by using a qualitative approach we seek in-depth understanding of individuals' experiences. With each of these approaches, we gain a specific perspective of the research problem. While quantitative research allows generalising the results to a whole

population, qualitative research provides in-depth understanding of the issue.

They further elaborate that in multi-method research, the researcher constructs knowledge about real-world issues based on pragmatism.

One reason for using multi-method research is that the use of both qualitative and quantitative approaches provides a more comprehensive understanding of the research problem than either approach alone. In multi-method research, the researcher might collect both quantitative and qualitative data at the same time (concurrently) and merge the data to form one interpretation of the data. This interpretation provides both quantitative information about magnitude and frequency, as well as qualitative information of individual perspectives from participants and the context in which they are commenting on the research problem. This design is also called the triangulation or concurrent mixed-methods design (Given, 2008:527).

Multi-methods allow for a research strategy that crosses the boundaries of conventional paradigms of research by deliberately combining methods drawn from different traditions with different underlying assumptions (Denscombe, 2007:107). As Denscombe (2007:107) describes it, in its simplest form, it is a strategy that uses both qualitative and quantitative methods and can be referred to as 'mixed methodology', 'multi-strategy research', 'integrated methods', and 'combined methods' research. Its pragmatist approach stems from the fact that the emphasis is on practical approaches to research problems (pragmatist), and a focus on 'problem-driven' research that treats more specifically answers to the research problem as the overriding concern. Researchers suggest that the collection of multiple forms of qualitative data (or multiple forms of quantitative data) might be considered multi-method research. Also in applying the definition, researchers will mix, combine, or link the data in certain ways (Given, 2008:527).

Descombe (2007) further indicates that pragmatism tends to revolve around five core ideas, three of which are reflected in my study. These are:

- Knowledge is based on practical outcomes and 'what works'. The key criterion for judging knowledge is how useful it is perceived to be and how well it works when applied to some practical problem.
- Research should test what works through empirical enquiry.

- There is no single, best ‘scientific’ method that can lead the way to indisputable knowledge.

The choice of the mixed-methods strategy for the current study was that of no sequence, but rather sequential, as far as its implementation is concerned (Creswell, 2003:211). In terms of priority, equal attention was given to both qualitative and quantitative approaches during the data gathering (Creswell, 2003:210). Integration of the two data was also mixed during data interpretation and at single phase (Creswell, 2003:212). Table 4.1 shows the decision choice.

Table 4.1: Decision choice for the current study (adapted from Creswell, 2003:213)

<i>Implementation</i>	<i>Priority</i>	<i>Integration</i>	<i>Theoretical Perspective</i>
Sequential – Quantitative; Qualitative	Equal	At data Interpretation	Implicit

An essential feature of a mixed-methods study, according to Yin (2011), is that it must retain its identity as a single study to address the set of research questions that deliberately requires complementary qualitative and quantitative evidence and methods.

A mixed methods study is not being done if an initial set of interpretations and conclusions is drawn solely on the basis of either the qualitative or quantitative method alone, apart from another initial set of interpretations and conclusions based solely on the other type of method. Even if the results from both methods are then compared, such separation has effectively split a mixed methods study into two distinct studies (Yin, 2011:291).

The study does not intend to compare the outcome of qualitative with those of quantitative results. It rather seeks to take advantage of the strength of the two methods in gaining an understanding of the phenomenon, while exploring the issues *in situ*. It is also meant to include all of the strengths of qualitative and quantitative research as complementary strengths (Onwuegbuzie & Johnson, 2006:51).

Mangan et al. (2004) and Denscombe (2007) highlight the benefits that can result from combining qualitative and quantitative methodologies. The use of different research approaches, methods, and techniques in the same study can help overcome the potential bias and sterility of single-method approaches through

methodological triangulation. While this study was interested in ascertaining how many graphic design students were involved in using ICT in the ideation process of graphic design—the form and structure of ICT tools in the ideation process and the perceptions of students and educators on ICT in ideation—it was also greatly interested in the participants’ views and thoughts on situations and ideation as elicited from observation and interviews, to further explore the phenomenon. This, in a way, served as a form of triangulating the findings in order to get a better understanding of the phenomenon from different positions (Denscombe, 2007:134). According to Mangan et al. (2004), ‘triangulation of research methods lends greater empirical support to the theory in question. Such methodological triangulation can compensate for the flaws, and leverage the strengths, of the various available methodologies’ (Mangan et al., 2004:569).

Table 4.2: Matrix of the research questions against research approaches

Main questions and sub-questions	Qualitative Approach	Quantitative Approach
What happens to the teaching and learning of ideation in graphic design when students begin to use ICT in direct contrast to traditional graphic design pedagogy?	X	X
How do the ICT methods affect the pedagogy of graphic design in a developing economy?		X
How do graphic design students and educators perceive ICT in the pedagogy of ideation in graphic design?		X
What informs the use of ICT by graphic design students in their ideation process?	X	
How does the introduction of ICT affect the teaching and learning of the ideation process in graphic design, especially in the modern studio?	X	

4.3.4 Concurrent triangulation strategy

In making decisions concerning strategy for the mixed-methods approach, Creswell (2003) proposes six major strategies, although these are not exhaustive. Among them is the Concurrent Triangle Strategy which is the most familiar, and selected as an attempt to ‘confirm, cross-validate, or corroborate findings’ (Creswell, 2003:217). In my study, both quantitative data and qualitative data were collected concurrently, with the results integrated during the interpretation phase. Survey interviews and questionnaires, observation, and documented data, allowed for the combination of the strengths of both data collection methods to counterbalance the weaknesses of

each other. While the survey questionnaire can provide the generalisable results within the quantitative method, the case study method of interviews and observation can reveal participants' points of view not captured with the questionnaire.

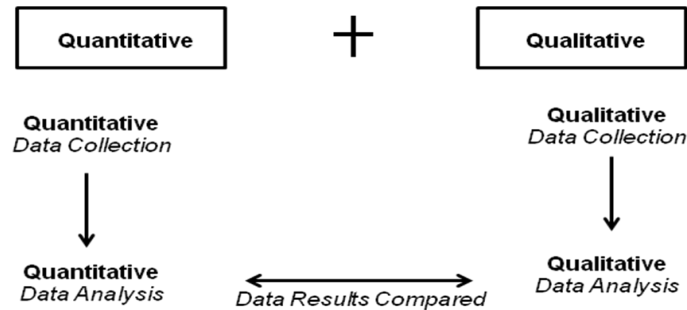


Figure 4.2: Diagram of triangulation of the research

4.3.5 Validity

Validity refers to 'the appropriateness, meaningfulness, and the usefulness of the inference a researcher makes' (Fraenkel & Wallen, 2003:169). This involves quality control methods used in collecting and interpreting the data in order to make it credible. Furthermore, it concerns the extent to which 'an empirical measure adequately reflects the real meaning of the concept under consideration' (Babbie & Mouton, 2001:122). Yin (2009) indicates four common tests that have been used to establish the quality of case study research. These are construct validity, internal validity, external validity and reliability (Yin, 2009:40). According to Yin (2011), 'a valid study is one that has properly collected and interpreted its data, so that the conclusions accurately reflect and represent the real world (or laboratory) that was studied' (Yin, 2011:78). He therefore calls for the use of design features that will strengthen the validity of findings.

Onwuegbuzie and Johnson (2006) do not see validity as an issue of truth but rather 'that a research study, its parts, the conclusions drawn, and the applications based on it can be of high or low quality, or somewhere in between' (Onwuegbuzie & Johnson, 2006:48). They argue

... because mixed research involves combining complementary strengths and non-overlapping weaknesses of quantitative and qualitative research, assessing the validity of findings is particularly complex. ... We therefore recommend that validity in mixed research be termed legitimization in order to use a bilingual nomenclature

(Onwuegbuzie & Johnson, 2006:60).

When preparing or selecting an instrument for use in the research, validity is the most important factor to consider. The important thing to realise is the degree to which evidence supports any inferences a researcher makes based on the data the researcher collects, using a particular instrument. It is therefore necessary for the researcher to use an 'appropriate, meaningful and useful instrument' (Fraenkel & Wallen, 2003:170). As Henning et al. (2004) point out, the design is not validated because of the use of many terms but because of 'the precision of all procedures and the indication of what the findings may mean (or do) for the research community' (Henning et al., 2004:146). This indicates how reliable the processes and data captured can be to the research community.

4.3.5.1 Construct validity

Construct validity for the current study was established with the use of multiple sources of evidence for the data collection. For example, the use of observation was not only meant to capture relevant data, but also to corroborate data that were captured during interviews with participants. Asking related and similar questions during interviews with multiple respondents also gave credence to issues that had been captured during observation. Moreover, answers received from students were later used as questions for lecturers as a way of ensuring data gathered from interviews were sufficiently valid for the study. These multiple evidences were also used as a 'chain of evidence' (Yin, 2009) to make relevant the data collected.

4.3.5.2 Internal validity

Concerning internal validity, Yin (2009) believes that the greatest concern for explanatory study is the issue of causal relationship that will make researcher conclude with inference. However, this issue becomes inapplicable during exploratory research, since there is no inference to be made. In this current study, I tried to report on issues 'just as' and described the situation as being presented by respondents. For the quantitative aspects, description of the data is also based upon the data as depicted in the graphs and pie charts that illustrate the data gathered.

4.3.5.3 External validity

External validity is about how the results can be generalised to other and similar phenomena and achieve the same results. This situation seems to be typical with single case studies, as per the current study. Yin (2009) asserts that critics of such

single case studies, however, confuse single case studies with survey studies, where the sample is generalised to a larger universe. He further asserts that such generalisation is possible when a replication of the study (of the same phenomenon) can be done at another site. My study is not meant to generalise a theory, but examine a phenomenon within a university in a developing country. The use of activity theory as a lens for the current study was not meant to test the theory, but was rather a window to integrate all the issues associated with the activity of learning and teaching of ideation.

4.3.6 Reliability

Reliability in real terms determines how consistent the data are in the research: both internally and externally. Internal consistency refers to whether the data are reasonable, given all that is known about the phenomenon or event, and eliminating common forms of human deception, whereas external consistency is achieved by verifying or cross-checking observations with other divergent sources of data. In other words, whether other evidence confirms the researcher's observations (Neuman, 2007:294). Such evidence will only be seen when the particular technique, applied repeatedly, yields the same results (Babbie & Mouton, 2001:119). Yin (2009) encourages researchers to demonstrate reliability in the execution of their study, especially in the data collection procedure, such that when the method is replicated, it will yield the same results.

In qualitative research, much can be done to achieve reliability and make the research credible. Creswell (2007) singles out the issue of acquiring enhanced, detailed field notes through the process of recording and transcription, and indicates the importance of a conscious effort to capture 'trivial, but crucial, pauses and overlaps' (Creswell, 2007:209). Since qualitative research involves intense personal involvement, researchers, however, believe that these grounds are insufficient for ensuring reliability and credibility. 'The validity of qualitative designs thus includes the degree to which the interpretations and concepts used have mutual meaning for both the participant and the researcher. These should, moreover, be employed so as to maintain the least amount of interference while increasing the quality of the data' (Maree & Van der Westhuizen, 2007:38).

In the current study, reliability was achieved by the use of a recorder for all interviews, as well as careful interpretation and transcription of interviews captured

with respondents. Where there were issues of ambiguity in sentences or words, the data were given to a neutral person for interpretation. Such issues were returned with corroborated results. Codes and categories that were captured were also given to three individuals separately for verification. Less than five percent were returned with changes, which indicated how reliably the data had been captured, transcribed and verified.

4.4 Data collection

The collection of data is of extreme importance in research since the conclusions are based on what the data reveal. Data collection involves a series of interrelated methods aimed at gathering good information to answer an emerging research question (Creswell, 2007). In qualitative research, this includes, among other things, 'setting the boundaries for the study, collecting information through unstructured (or semi-structured) observations and interviews, documents, and visuals materials, as well as establishing the protocol for recording information' (Creswell, 2003:185).

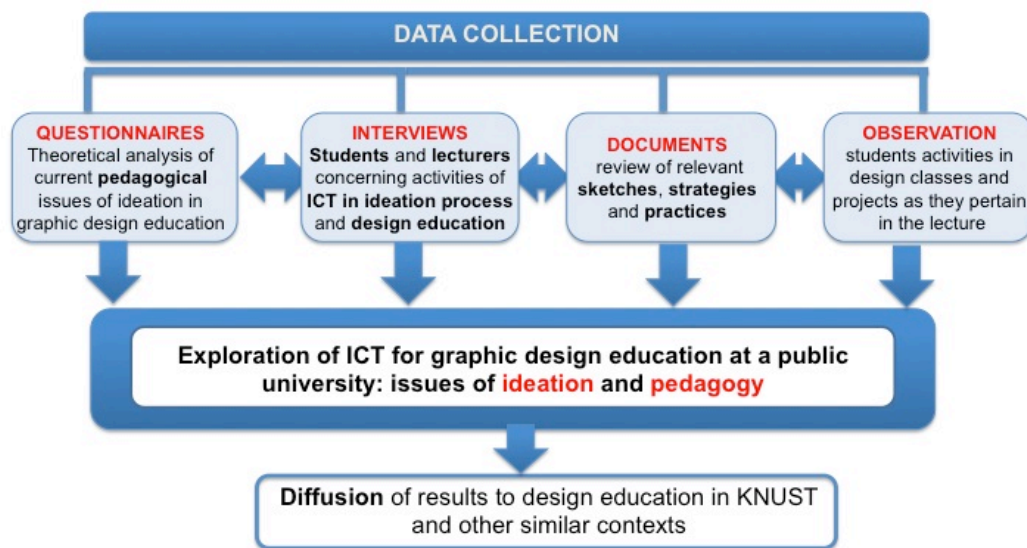


Figure 4.3: Diagram of data collection method

Yin (2009) mentions six sources from which case study evidence could come. They are documents, archival records, interviews, direct observation, participant-observation and physical artefacts (Yin, 2009:99). Three of these were used in the qualitative approach to this study. These were interviews, direct observation of activities of students and lecturers—both in the lecture rooms and studios, and documentation. These were opportunities for respondents to express their views in an open-ended questionnaire, in semi-structured interviews, and in discussions.

Further qualitative methods included documentary evidence: thumbnail sketches and designs of students (documents)—both hard and soft copies of their ideation processes.

4.4.1 Issues of multiple data sources

The use of multiple sources of data was to ensure that available data really did address the case being investigated. Yin (2009) indicates the benefit of multiple data sources within three relevant principles, which can help researchers in establishing the construct validity and reliability of the case study evidence. These principles include making use of multiple sources of evidence, creating a case study database, and maintaining a chain of evidence. In all these, the fundamental issue is for the researcher to have some insightful investigation so that the final results ‘reflect a concern for construct validity and for reliability ... worthy of further analysis’ (Yin 2009:124).

4.4.2 Interviews

One of the important methods used in case studies and by qualitative researchers is interviews of selected individuals or informants. It is an ‘important way for a researcher to check the accuracy of—to verify or refute—the impressions he or she has gained through observation’ (Fraenkel & Wallen, 2003:509). With an interview, one is able to ascertain what is in people’s minds: what they think and how they feel about issues.

According to Yin (2011:133), when people use the term ‘interviewing’, they usually refer to structured interviews:

People think of interviews as being part of some sort of survey or poll. These studies also call for drawing a representative sample of participants or interviewees, closely attending to the definition and drawing of the sample to make it as precise as possible. Appropriate statistical tests then assess the link between a study’s findings and the sample’s larger population. Given all these conditions, if a study only uses structured interviews, the study is most likely to be a survey or poll, not a qualitative study. If you emulate completely the methods used in conducting structured interviews but also use qualitative methods to collect and analyze additional kinds of data, you are likely to be doing a mixed methods research study (Yin, 2011:133).

The options of both in-depth and focused interviews were adopted, where participants were interviewed for a short period but specifically on the facts as well as on their opinions of the phenomenon (Yin, 2009:107). They were conducted together with the reviews of documents and literature, followed by months of observation of activities in the studio and lecture rooms. The questions were designed to elicit specific answers in respect of ICT usage in ideation, as well as to corroborate certain facts already captured through observation and documents (Yin, 2009:107). Moreover, the responses were later compared and contrasted with information already gathered from other sources (Fraenkel & Wallen, 2003:509).

To avoid defensiveness from informants, almost all the questions posed avoided the 'why' questions (Yin, 2009:106). In all, nineteen interviews were conducted: nine (9) with lecturers and ten (10) with students. These were recorded with recording devices and with permission from informants before the process, in accordance with ethical considerations. All informants were comfortable with the recordings, which created a relaxed, cooperative atmosphere.

4.4.3 The interview setting

My role as interviewer was to create an atmosphere conducive to the interviews, and also to offer the necessary support and confidence to the interviewees. At KNUST, since I had been working in the faculty for some time, discussions with the faculty about my research received the requisite positive responses. Appointments were booked with members of the faculty in their offices at specific times at their convenience, where the atmosphere was also not intimidating. Less informal seating arrangements at a slight angle off-centre were used to make the interviewees more relaxed. For student interviewees, I made appointments to meet them in particular places and at convenient times. Incidentally, almost all agreed to meet me at the studios at times that did not conflict with their lectures or interfere with the work of their colleagues. Two were booked to meet at the student centre at times when it was not busy, to ensure they were relaxed and cooperative.

In all the interviews conducted, I relied on a digital audio recorder (Panasonic RR-US571), which was always placed on a nearby table (with the consent of the interviewee), so that the interview could be recorded clearly, but did not appear intrusive (Yin, 2009:109). With the recorder, I was able to capture all that was said.

Care was taken not to distract the interviewees, or to slow down the conversation. Before the interviews, I engaged interviewees in informal discussions and conversations about some minor activities within the department, and the specific courses being investigated for the research study. These in a way were used to set the stage for formal interviews and also to validate some of the pre-determined questions for the interview. In some instances, I had to go over the purpose of the study and discuss the amount of time that would be needed. Consent letters were then given to interviewees to read, to obtain their consent, assuring them of anonymity and privacy (Creswell, 2007:134). In all situations, interviewees were relaxed; since they chose their own locations for the interviews, they were comfortable with the environment. This was evident from their non-verbal communication and posture. There was no discernible evidence of 'tense moments' or 'hostile' situations.

4.4.3.1 The choice of interviewees

The success of interviewing for case study research depends on finding the right person(s) 'who is (are) best qualified, in terms of your research question, to provide you with the information required' (Nieuwenhuis, 2007b:88). In respect of lecturers at KNUST, all seven members of the department during that academic year were interviewed. They comprised a blend of young and old lecturers, with experience ranging from 3 to 33 years of teaching in higher education institutions. The choice of two other lecturers from the Cape Peninsula University of Technology, Cape Town, was that of purposeful sampling, which was informed by earlier discussions I had had with some members of the department—a situation akin to snowball sampling. However, these discussants were not straightforward in their selection of names of whom to contact. But based on the discussions, I opted for those whose backgrounds closely aligned with my study and who were ready to share their experience in this area. The first three lecturers that I approached were willing, and I had the good fortune to be able to rely on two of them.

On their part, students were given the option to indicate their willingness to offer themselves for possible follow-up interviews during their answering of the quantitative questionnaires. Such students were asked to provide their cell phone numbers and email addresses. Based upon their responses on the questionnaire, random purposeful sampling was done for the selection of the interviewees (Creswell 2007:127). They were later contacted telephonically about their

willingness and readiness to be available for the interviews.

4.4.3.2 The interview protocol

From predetermined questions and question ordering, to unstructured interviews with a more conversational format in open-ended questions, my interviews were semi-structured. Even though I had predetermined questions, it was realised that adhering to the rigid predetermined set of questions was not going to allow interviewees to elucidate their information comfortably. Moreover, the informal discussions held prior to the main interviews created an atmosphere that really negated the issues of using a structured questionnaire. Using the semi-structured format meant that I was not following the exact wording and order of questions as was predetermined. It also enabled me to ask follow-up questions when unanticipated issues emerged during the interview, thus enabling me to probe for more answers to earlier questions.

The interview protocols were grouped into portions that sought to explore student/lecturer perceptions of ICT with ideation, studio activities as far as ICT and large classes were concerned, pedagogical issues concerning graphic design and ICT, general information about ICT in graphic design education, and access to ICT resources and their use in teaching and learning graphic design in the departments. Inasmuch as I wanted the interviewees to feel at ease in their approach, it was also important that my research questions were not overlooked. Therefore, in situations where I experienced some restraint in responses, I had to ask follow-up questions as a way of bringing interviewees back into focus.

4.4.3.3 Observations

In capturing data through observation, a researcher makes a conscious effort to capture the behaviour and activities of participants on the research site (Creswell, 2003:185). The aim is to observe (see and hear) the researcher's own version of what is 'there' (Henning et al., 2004:81). This is because certain kinds of research questions can best be answered by observing how the people act, behave or how things look (Fraenkel & Wallen, 2003:535).

Babbie and Mouton (2001) caution researchers to observe and record, at least, the most important empirical activities, since one cannot hope to observe everything and record every observation (Babbie & Mouton, 2001:294). Since one cannot trust the

memory of all activities observed, researchers are advised to add to their recorded field notes, photographs and video recordings taken at sites (Babbie & Mouton, 2001; Yin, 2009).

The option of observer-as-participant was adopted in this study, with the researcher not taking part in any activity of the study being observed. This was in contrast to participant-as-observer, where one acts as a participant and an observer at the same time. The researcher's identity was known right from the beginning, with no pretence of actually being a participant against a complete participant-observer whose identity as an observer is hidden to the individuals being observed (Fraenkel & Wallen, 2003:535). According to Fraenkel and Wallen (2003:535), such a condition of covert observation is suspect on ethical grounds.

The period of observation spanned between four and eight months of the second semesters, when students had returned from a four-month internship. Lecture room activities, as well as students' individual activities at studios away from normal lecture hours, were thoroughly observed. Video recordings of lectures of both third- and final-year classes were also done at certain times, with the help of a research assistant. Such recordings captured activities involving students' developing ideas as solutions to design problems. Field notes recorded were later compared with the video recordings of the activities to avoid observer bias that might have arisen. It also helped to overcome threats to internal validity.

4.4.3.4 Documents

In qualitative research, examination of documents can offer some credible data for the research. These may be public documents (e.g. newspapers, minutes of meetings, official reports) or private documents (personal journals and diaries, letters, emails) (Creswell, 2003:188). Others may be photographs, drawings and sketches. The most important use of documents in a case study is to corroborate and augment evidence from other sources (Yin, 2009:103). Moreover, it helps clarify details like spelling of names, and also directs researchers' questions during interviews as a way of complementing field interviews and conversations (Yin, 2011:149).

In this study, sketches and drawings by students were examined. These were later compared with final designs created by students as a solution to design problems,

as given by lecturers' briefs. Through the observation of activities and documentation, some questions for interviews were formulated. These were to serve as issues of validation and also for corroboration of the real issues of the phenomenon I was exploring. After the interviews, I also had to go back and examine some of these documents to verify some of the issues that emerged during the interviews, especially during the interviews with students.

4.4.3.5 Questionnaire

Questionnaires, as Gray (2004) points out, 'are research tools through which people are asked to respond to the same set of questions in a predetermined order' (Gray, 2004:187). They are one of the most widely used primary data gathering techniques, and should be used when they fit the objectives of the research. One advantage of questionnaires is that they can be given to a large number of people at the same time (Fraenkel & Wallen, 2003:142).

Since the research comprised a concurrent triangulation strategy approach, both the quantitative as well as the qualitative data of the questionnaires were collected concurrently. A questionnaire of 54 questions (see appendix B) was given to 239 students at the Kwame Nkrumah University of Science and Technology (KNUST).

The questionnaires were handed to students at the entrance to their class as they entered the classroom. In this way, any student from any of the two groups —year 3 and year 4 — could be considered. Once the required number of questionnaires had been distributed, students that had access to the questionnaires turned out to be truly representative of the entire class. This was to avoid selection bias where questionnaires were given to favoured students only. Students were encouraged to answer the questionnaires and return them to their lecturer, who put them in a box and handed them to the researcher at the end of the class.

Before that, the lecturer explained the ethical requirements of informed consent, and allowed those not willing to participate to opt out. Significantly, almost all students available were ready to participate in the questionnaire. Interestingly, when the questionnaires were returned, one student had not answered the questionnaire. Since participation in the process was voluntary, such responses were seen as indications of participants' withdrawal.

The questionnaires were in four (4) sections made up of fifty-four (54) questions in total. The first was to ascertain the practical views of accessibility of ICT of the respondents; the second was to establish participants' current perceptions of ICT in idea development. To this end, the listed items were all closed-ended questions to avoid ambiguity in the responses. The third section comprised open-ended questions aimed at allowing respondents to indicate their own opinions of ICT and ideation, difficulties and concerns, as well as comments participants might have on the study. The last section was to gather general personal data from participants.

4.4.4 Population sampling

While population is the theoretically specified aggregate of the study elements, sampling refers to the process of selecting a number of individuals (a sample) from the population, preferably in such a way that the individuals are representative of the larger group from which they were selected (Fraenkel & Wallen, 2003:671). It implies the selection of a section of observation from an otherwise larger group (Babbie & Mouton, 2001). It is possible for a population to become a sample, depending on the context of the study. In this context, the population of interest comprised graphic design students at a university in a developing country. Graphic design students at KNUST were the population sample for this study. According to Yin (2011) 'sampling challenge arises from needing to know which specific units to select and why, as well as the number of the units that are to be in a study' (Yin, 2011:87). Creswell (2007) proposes a purposive sampling strategy for qualitative research. This was the choice for this study.

4.4.4.1 Purposive sampling

In purposive sampling (also called judgemental sampling), a researcher makes a conscious effort to choose individuals that 'can purposefully inform an understanding of the research problem and central phenomenon in the study' (Creswell, 2007:125). Purposive sampling was used because the researcher had prior knowledge of the population, and specific purpose suggest that those representative have the needed information (Fraenkel & Wallen, 2003:112). According to Babbie and Mouton (2001), such characteristics target a subset that will enable a reasonable element of generalisation concerning the target population.

In the context of this research, the students and lecturers of the Department of Communication Design, Kwame Nkrumah University of Science and Technology

(KNUST), were identified as the research population. KNUST was chosen as the sample site because it is the only university in Ghana offering a degree programme in graphic design. General Design, Advertising, Illustration, Photography, Video Production, Animation, Computer Graphics, and Graphic Design Production are some of the courses currently taught in the department in training students for the communication design industry. The programme was designed according to the Bauhaus principle, and this has continued to be the main driving force of the department, even though there has been some revision since its inception. It is a four-year degree programme that leads to the award of a Bachelor of Arts (BA) in Communication Design.

4.4.4.2 Participants

The population under study comprised the students of the Department of Communication Design, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana. The population of students of the department is 463, of whom 157 are female and 206 are male.

The researcher assumed that the target population was a true representation of the Department of Communication Design and could provide credible information for the research, based on the following:

1. The students of communication design undergo the design process during their practical work after two years of basic design, where thumbnail sketches are the fundamental approach to design and the creative process.
2. During their third year, students undertake internships at professional design studios, where they work outside the university context.
3. The third- and final- year students have learned the discourse of design and have gained sufficient practical work experience, both academically and through internship training.
4. During the internship, students are exposed to industry conditions, working under strict supervision and with the added stress of deadlines; they therefore experience actual design within real-time situations in professional design studios.
5. Their experiences could enable them to give practical responses to the research questions.

The data was obtained from a subset of the total population in such a way that the

knowledge gained would be factually representative of the total population under study. This was further targeted to only third-year and final-year students of the Department of Communication Design—that is 117 and 121 respectively. Based upon the population, 213 of the target population comprised a credible sample for the study (Sekaran, 2003:295). Of the total of 463 students in the Communication Design Department, 238 students were selected and given the questionnaires for the population sample.

Table 4.3: Cross tabulation of population: gender and level of study

		Level of study		Total
		3rd year	4th year	
Gender	Count	6	3	9
	% within gender	66.7%	33.3%	100.0%
	% within level of study	5.1%	2.5%	3.8%
Female	Count	34	51	85
	% within gender	40.0%	60.0%	100.0%
	% within level of study	29.1%	42.1%	35.7%
Male	Count	77	67	144
	% within gender	53.5%	46.5%	100.0%
	% within level of study	65.8%	55.4%	60.5%
Total	Count	117	121	238
	% within gender	49.2%	50.8%	100.0%
	% within level of study	100.0%	100.0%	100.0%

It was revealed that out of 238 questionnaires given out, males, hundred and forty-four (144) and eighty-five (85) by females answered the questionnaires. Out of this number, thirty-four (34) were female and seventy-seven (77) were males among the third year group, with six not indicating their sex, thus adding up to a total of one hundred and seventeen (117). Sixty-seven (67) males and fifty-one (51) females were also recorded for the fourth year group with three (3) not indicating their sexes, making the total number of fourth year students making up of one hundred and twenty-one (121). Even though the study captures percentages of respondents in terms of gender, there were no theoretical justifications in the use of gender as far

as this study is concern. Table 4.1 indicates the cross tabulation of gender and level of study of the students. Figure 4.4 also indicates the bar chart of the gender of the population sample.

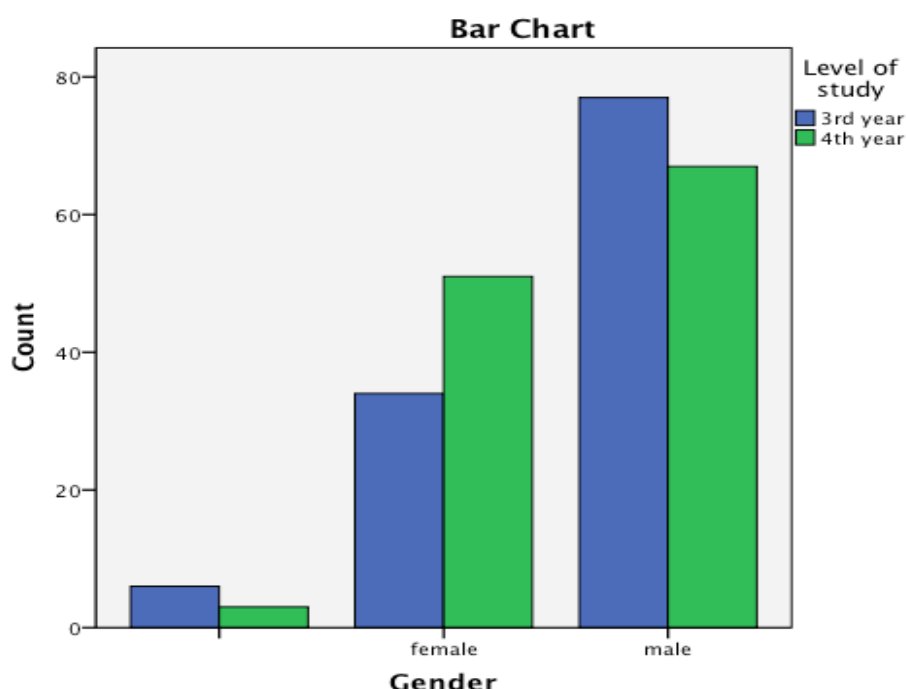


Figure 4.4: Bar chart of gender of students for the population sample

4.4.5 Analysis of the quantitative data

According to Babbie and Mouton (2001:422), 'most social science analysis falls within the general rubric of multivariate analysis', the examination of several variables simultaneously. Bhattacharjee, (2012:119) also mentions **descriptive analysis** and **inferential analysis** as the two different ways that 'numeric data collected in research projects can be analysed quantitatively'. **Descriptive analysis** means describing, aggregating and presenting the constructs of interest and associations between these constructs, while **inferential analysis** refers to statistical testing of hypothesis (Bhattacharjee, 2012:119). Multivariate analysis can be understood by looking at the fundamental analytic modes, which are univariate and bivariate. While univariate refers to the examination of cases on only one variable, bivariate looks at the comparisons of two or more variables (Babbie & Mouton, 2001).

'The purpose of univariate analysis is purely descriptive' (Babbie & Mouton,

2001:430). The analysis of the quantitative part of my study was essentially descriptive—using the univariate analytical lens to describe only one variable, mostly by the percentages. There were instances where frequencies and sometimes the mean were also reported, especially with the data from lecturers. Frequencies were used to show the number of cases that had each attribute of the variable (Babbie & Mouton, 2001:437), lecturers were chosen because of the small number of respondents. Using percentages would have given a sense of false reporting, since the percentages would not have been a true reflection of the number on the ground. In Section 2, the respondents were asked to rank their responses on a 5-point Likert scale. These are: 1= neutral/indecisive, 2 = strongly disagree, 3 = disagree, 4 = agree and 5 = strongly agree.

4.4.6 Analysis of the qualitative data

Data analysis indicates the true test of the competence of the researcher. According to Yin (2009), data analysis in a case study ‘consists of examining, categorising, tabulating, testing or otherwise recombining evidence to draw empirically based conclusions’ (Yin, 2009:126). In qualitative research, the analysis of data involves ‘a process that requires analytical craftsmanship and the ability to capture understanding of the data in writing’ (Henning et al., 2004:101). Furthermore, the researcher also has to show an understanding of design logic, fit the analysis of the procedures with the methodologies of the study, and consistently and coherently manage the analysis process according to the principles of the study.

Activity Theory (Section 3.3), which was the theoretical lens, was used to focus in analysing the data that was captured around the major aspects of ideation as an activity in graphic design. This was captured in the major headings of the theory as aligned with the research: students, ICT tools, design principles, studio, lecturers’ interaction, design process and creative works, with ideation as the main activity.

My challenge was how to make meaning of the numerous data gathered during the interviewing process of nineteen respondents in order to tell the story of the phenomenon of ICT in ideation activity in graphic design. After repeated listening, I transcribed the responses. This gave me a more comprehensive idea of the data, which enabled me to reflect deeply upon statements made by the respondents. With the aid of the third version of Qualitative Content Analyser (QCA) software that had recently been developed (although still in the trial version, it proved to be valuable

and quite reliable), the data was defragmented into codes and categories. The QCA allowed me to capture the statements of the individual interviewees and their transcriptions and assign various labels or categories to depurate what had been captured. The data was broken down into smaller fragments or pieces, which could be considered a disassembling procedure (Yin, 2011:178). Using a combination of inductive and deductive coding, and based on the literature reviewed, various categories and later themes were derived from the data obtained through observations, interviews and documents. Deductive coding implies that the codes were pre-determined by prior knowledge of the subject, and then allocated to particular parts of the transcribed text through the extensive literature reviewed. Inductive coding, on the other hand, implies that the codes were developed as the information was presented. The process was repeated several times, eliminating duplicated categories. In the end, 316 categories were captured from all the transcriptions. Significantly, a lot of trial-and-error processes of testing codes were done, after which the codes, together with their denotata, were given to selected individuals as a way of testing the reliability of the categories. Fewer than nine percent were reported as unclear, and were later amended with different codes as suggested by the individuals.

A graph of the 316 codes indicated groupings of 'highly significant' to 'moderately significant', and 'less significant' categories. These codes were also grouped inductively under six themes. These were also re-grouped under the main aspects of the theoretical items. Even though the categories were grouped under themes as they emerged, I was also conscious of other significant themes that seem to be emerging from the categories from the theory that was used as a lens in the study. These gave credence to the concept of 'multi-strategy research', 'integrated methods', 'multi-method research' and 'combined methods' research, to which my study subscribed in my methodology (Denscombe, 2007:107).

4.4.7 Ethical considerations

In order to comply with ethical codes of the study, permission was requested and secured to gain access to study activities of graphic design by students and lecturers, conduct the interviews with participants and also to administer the questionnaire in the various departments. The researcher was allowed access to studios and took part in lectures in order to observe activities of students and lectures. A letter explaining the study and its aim preceded the questionnaire for the

quantitative survey (appendices 1 - 4). It also included a statement that allows respondents to opt out should he/she decide to do so, since the research study was a voluntary activity for those being studied. The participants were older than 18 years of age. Hence, conformation is given that the data collected for the study will do no harm to anyone concerned. Furthermore, participation in my research was voluntary. No incentives were offered, as the research was academic in nature.

Before the interviews, a confidentiality agreement was signed which permitted the researcher to use the information obtained. This agreement prohibited the disclosure of respondents' names in this thesis. The letter assured the anonymity and privacy of respondents, as far as the studies were concerned, and had to be adhered to with all seriousness. The names of all students were replaced with pseudo names, whereas those of lecturers were replaced by their order of contact with study. This was done to ensure the confidentiality and anonymity of the respondents and also to ensure they give off the best in their responses. Interview questions were limited to aspects such as implications, effectiveness, theoretical foundations and respondents' views on mobile learning. The questions did not address participants' personal lives. Interviews with students and the lecturers in the field lasted between 15 and 40 minutes on average. A detailed description of the research objectives was given. It was emphasised that the research was for academic purposes. The researcher intended no bias, and the respondents were at no risk of physical, psychological, legal or social harm stemming from their participation in the data collection process.

Depending on the interests of individual respondents, I intend to give those participants who explicitly asked for it, feedback on the outcomes of my research, with the permission of the Cape Peninsula University of Technology, after I have presented my research report.

CHAPTER FIVE

IMPLICATIONS OF ICT METHODS FOR THE PEDAGOGY OF IDEATION:

QUANTITATIVE OVERVIEW

5.0 Overview

In Chapter 1, I indicated the aim of the study as exploring the role of ICT as a tool for teaching and learning in the ideation process in graphic design and ascertaining the extent to which ICT is used during the process of ideation. The objective was:

- To assess the use of ICT in ideation in graphic design education in the context of large class numbers and to explore how applicable ICT in ideation is, in the light of current design industry practices.
- To evaluate lecturers' and students' perception of ICT as it relates to the process of ideation in graphic design.

These objectives will be further explored by determining the extent of use of ICT in the ideation processes in graphic design in a developing country. Various questions from lecturers and students provided data to support ICT usage at various stages of teaching and learning ideation in graphic design education. These are presented as descriptive statistics from the quantitative data, as well as the frequency from the qualitative data. The analysis and discussions will be addressed in an attempt to confirm, cross-validate and corroborate findings (Creswell, 2003:217), since multi-methods of quantitative-qualitative sequential procedures were adopted. The discussions in this section are guided by the first main research question:

- **What happens to the teaching and learning of ideation in graphic design when students begin to use ICT in contrast to traditional graphic design pedagogy?**

The objective of this section is to discuss initial findings that seek to support the idea that ICT is used in the teaching and learning process of ideation in graphic design. These discussions are aimed at answering the research sub-questions:

- How do graphic design students and educators perceive the use of ICT in the pedagogy of ideation in graphic design?
- What informs the use of ICT by graphic design students in their ideation process?

And since this is multi-methods of quantitative-qualitative sequential process, I intend to present the quantitative findings before the qualitative ones and discuss

aspects of the data gathered from students and lecturers that will shed light on the main questions. In the end, my aim is to retain the singularity and integrity of the mixed method as my research design. This will be done by reflecting on the relationship between the qualitative and quantitative components, and analysing and interpreting them individually and collectively, before arriving at the main conclusion (Yin, 2011). In this chapter, I will be looking initially at the responses of the students, and then follow with those of lecturers.

The questionnaire for this aspect, required students to respond to 54 questions subdivided into four dedicated sections. **Section 1** (questions 1 – 14) relates to ‘**access to ICT and the Internet**’; **Section 2** (questions 15 – 45) relates to perceptions of issues relating to methods and uses of ICT in ideation pedagogy; **Section 3** (questions 46 – 48), involves open-ended questions eliciting respondents’ opinions of ICT through brainstorming and sketching; and **Section 4** (questions 49 – 54) relates to general information about respondents.

Before engaging in any in-depth discussions about the data from students, it is imperative to give a brief profile of the respondents. As indicated in Section 4.4.4.2, of the 463 total of students in the Communication Design Department 238 students were given the questionnaires, based upon the purposive sampling for the population sample. The section that follows discusses the gender and level of the respondents.

5.1 Student profile (Section 4 of questionnaire)

5.1.1 Gender and level of study

These questions, which relate to general information about respondents, were deliberately put at the end of the questionnaire (**Section 4: 49 – 54**), since I wanted to focus on the major issues at the onset. Placing these questions as the last section of the questionnaire does not negate their importance. It was rather done out of convenience for respondents. Moreover, it was seen as relatively easy for respondents to answer them when they seemed to be exhausted by the numerous questions in earlier sections. Out of the total number of 238 questionnaires given out, 144 were answered by males and 85 by females, representing 60.5% and 35.7% respectively. A relatively small number of 9 respondents (3.8%) did not indicate their sex, even though they answered the questionnaire. This situation did not impact on the results of the study, as there was no major gender-related issue in

the findings. 117 of the total number were third-year students; thirty-four (34), which is 29.1%, were female, and 77, that is 65.8%, were male; with 6 (5.1%) not indicating their sex. The total number of fourth-year students was 121; of which 67, which is 55.4%, were male and 51, which is 42.1%, were female, with 3 respondents, which is 2.5%, not indicating their sex.

5.1.2 Age analysis

Twelve students (12), representing 5%, did not indicate their age of the total number of 238. Responses captured indicated eight (8) students aged 20 years as being the youngest. Three of the respondents were over 30, while the median age was 22. The mean age was captured as 22.14. A significant majority of the respondents were between the ages of 21 and 25. This age also indicate that the majority of the students were 'Generation Y' students. Characteristically, Generation Y grew up with technology and will rely on it to perform their jobs better. Figure 5.1 indicates the age distribution of the respondents.

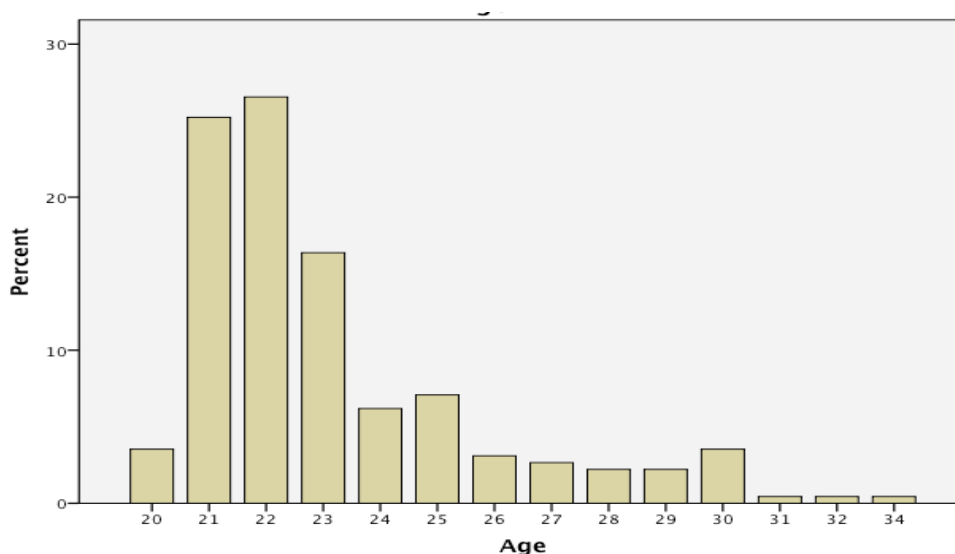


Figure 5.1: The age analysis of students

5.2 Access to ICT and the Internet (Section 1)

5.2.1 Availability on campus

There was the need to ascertain how often students from the graphic design department enter the university campus. In response to the question '**How often do you enter the university during the semester?**' 207 students (as indicated in Figure 5.2), representing 87%, indicated their presence on campus daily; 20 students (8.4%) were on campus weekly, with 5 (2.1%) students being available

monthly. Interestingly four respondents (1.7%) indicated they never entered the campus. How these four students are able to cope with their studies is difficult to comprehend, since they indicated that they never entered the university campus during the semester. Ironically, at the time of administering the questionnaire, these students were available to answer this questionnaire. It seems these students were not able to answer the questionnaire correctly. From the responses, one can confidently say respondents were the right people to offer information concerning academic activities concerning ideation and pedagogy.

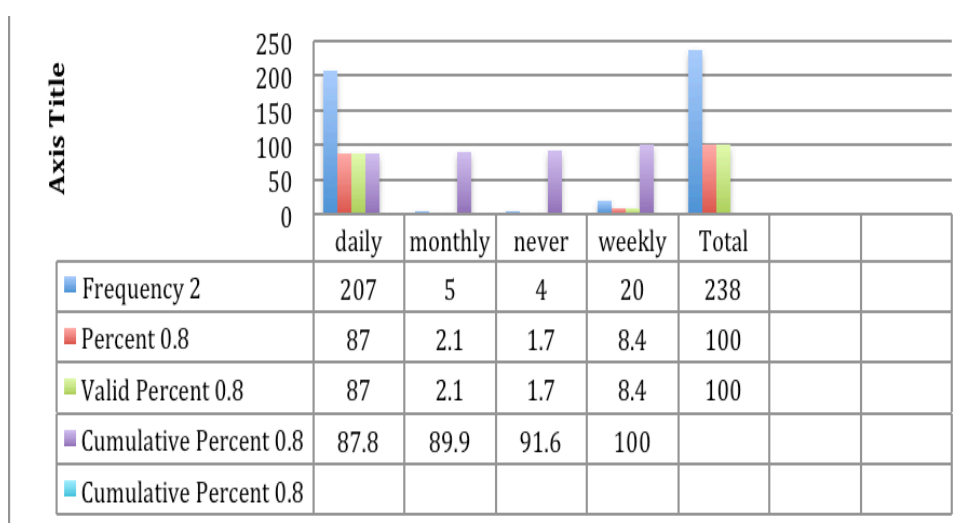


Figure 5.2: The number of times students enter campus during the semester

5.2.2 Accessibility, connectivity and usage

In analysing the research problem, it is important to establish the extent to which students have access to ICT, its connectivity and how ICT is used in students' everyday academic activities. This will help in understanding the extent of the use of ICT and how ICT influences the ideation process.

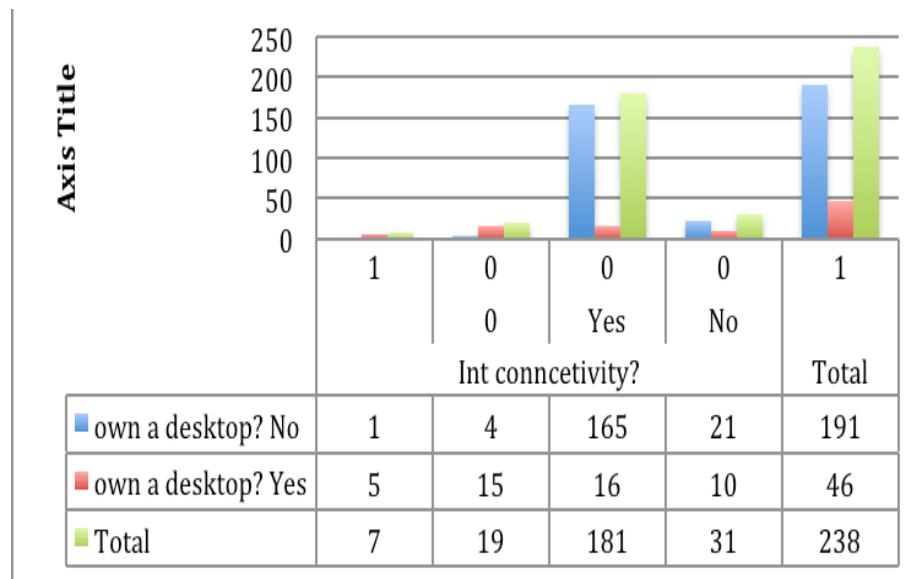


Figure 5.3: Cross tabulation of students owning laptop and their connectivity to the Internet

5.2.3 Access to computer technology

Responses to the question: ***‘Which of the following devices do you have: desktop PC, laptop, cell phone and PDAs?’*** indicate that the majority of students have access to more laptops than desktops. Of the 238 respondents, 208 have access to laptops, of which 181 can be connected to the Internet. The figure represents 87.1% of the total respondents. Forty-six respondents have access to desktop computers, indicating that even though they might not have access to laptops, these respondents do have access to computers. Others have access to both laptops and desktops as indicated by the responses. Almost all respondents who have access to laptops own them. What this means is students’ access to computers is high. From the responses, it can be deduced that students currently believe and understand that graphic design without ICT and computer technology is near impossible. This also affirms the issue that computers are becoming a valuable medium for designers in relation to the use of conventional media for graphic design. ICT and computer technologies might not be the main media for developing ideas, but they are indispensable.

5.2.4 Connectivity to the Internet

Having access to computers may not be sufficient, since the Internet might also play some key role in the ideation process. The questionnaire further attempted to ascertain if the computers could be connected to the Internet. Data from

respondents indicated the majority of the laptops were capable of being connected to the Internet. Of the 208 respondents who have access to laptops, 181 were capable of being connected to the Internet. Of the 46 desktops to which respondents has access, 10 could be connected to the Internet. Ironically, the number of computers at the department's laboratory numbered 16, and there is an indication that such computers were part of those connected to the Internet. Figure 5.4 captures the details.

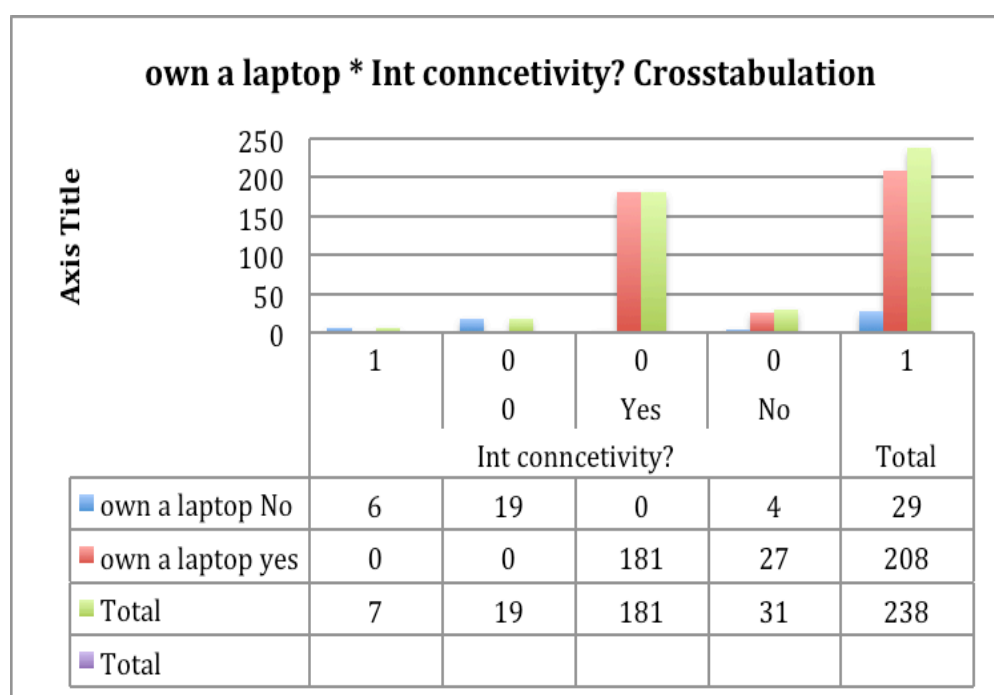


Figure 5.4: Cross tabulation of students owning desktop and their connectivity to the Internet

5.2.5 ICT use by students

As part of the study, I wanted to establish how long students spend on ICT use. In response to the question: '**Can you estimate how many hours you spend on the Internet?**' results (Figure 5.5) indicated that 67% of the respondents spend 1 – 3 hours daily on the computer with a few students (1%) spending 11 – 15 hours on the Internet. Following that question was the need to establish if this majority of respondents spend these hours in doing course-related work. Results from that question (Figure 5.6) indicated higher percentage of 72% of the respondents spend 1 – 3 hours on the Internet for their coursework. If the majority of the students are spending this amount of time on the computer as a result of their doing coursework,

then there is the inference of ICT's influencing their way of learning idea development. How the students use their time on the Internet in relation to their coursework to some extent demonstrates how ICT is influencing their graphic design education.

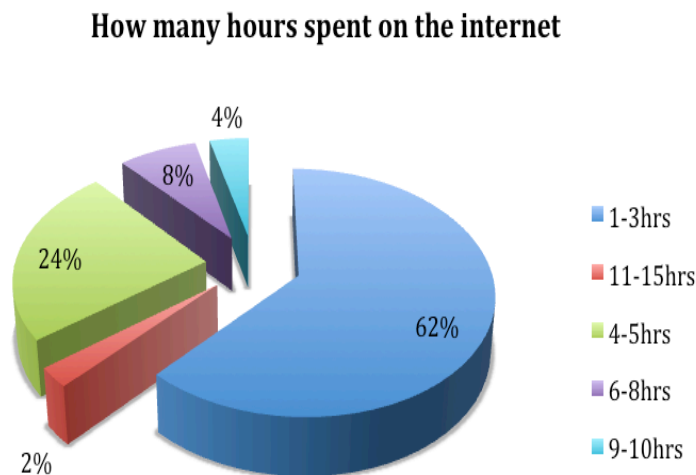


Figure 5.5: Hours spent by students on accessing the Internet

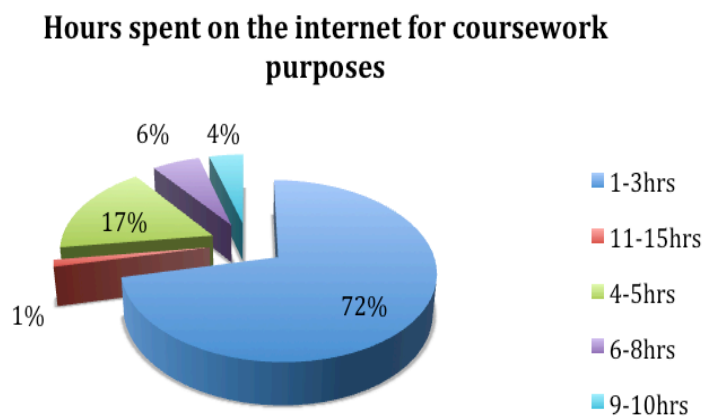


Figure 5.6: Hours spent by students on the Internet for coursework

5.2.6 Place of accessing the Internet

Having access to ICT is very important for graphic design students. However, the place of accessing the Internet was also significant for this study. Students were therefore asked to indicate where they mostly accessed the Internet. From the

responses, the majority of the students indicated 'campus' as their main place where they access the Internet, followed by 'home' and then 'Internet café' (Figure 5.7). Looking at the responses, one might be tempted to believe that using the Internet on campus is much easier and cheaper. However, when students were asked to indicate how easy or otherwise accessing the Internet on campus was compared with other places, the majority of them found it easy to access the Internet at home, rather than on campus. Reasons for such an outcome were not captured in the questions. However, since the majority of students use ICT for their course work, it can safely be deduced that students will want to use the Internet to seek information during the brainstorming process. Moreover, when briefs are given, there is the tendency for students to stay at the university and brainstorm for the initial ideation process, no matter how difficult it may seem.

If accessing the Internet at home is easier, yet students prefer accessing the Internet on campus, this is probably because they might be using the Internet for their graphic design courses on campus, where they do their assignments and coursework.

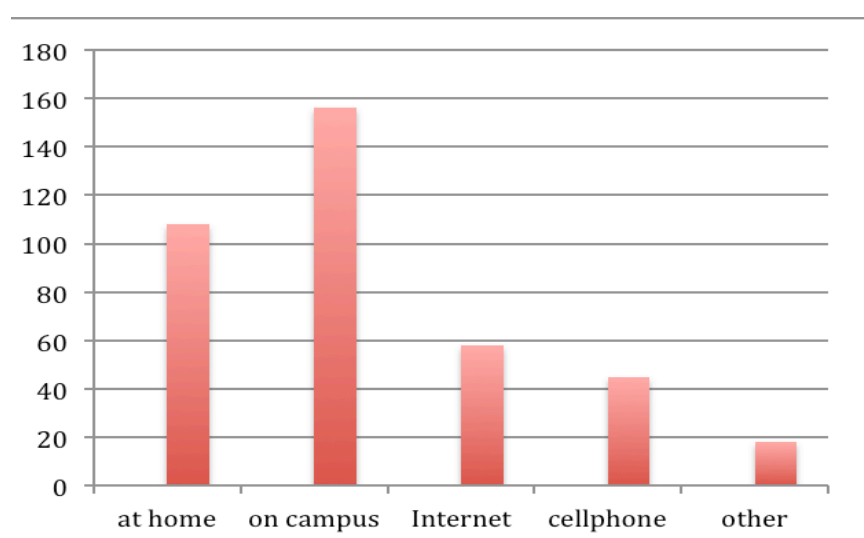


Figure 5.7: Graph showing the places where Internet is accessed

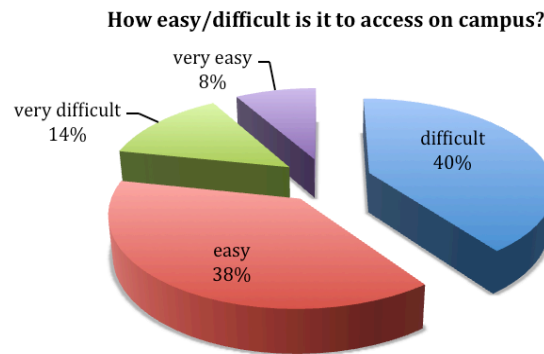


Figure 5.8: Ease or difficulty of accessing Internet on campus

How easy/difficult is it to access on campus?

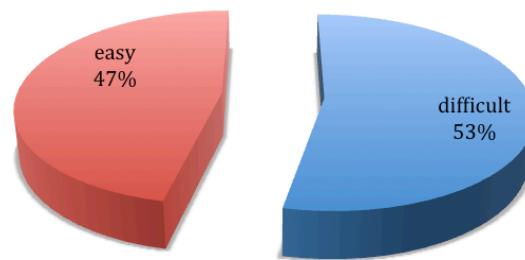


Figure 5.9: Collapsible diagram of ease or difficulty accessing Internet on campus

5.2.7 Acquisition of ICT skills

Since the majority of students own and use computers, it was imperative to find out how students acquire their computer and ICT skills. Moreover, computers are becoming a valuable technological tool for graphic designers in relation to the use of conventional media. Students were therefore asked to indicate the two most important methods they adopt when confronted with the acquisition of computer knowledge and skills. In their answers to the question: ***'How do you acquire new computer skills when you need them?'*** data available (Table 5:1) indicated the two predominant ways as ***'teach myself'*** and ***'ask a colleague or friend'***. For students to acquire their computer and ICT skills, they have to find a way of learning these themselves, and also ask their colleagues or friends, since available

information indicates that the department does not have a curriculum that supports the teaching of such skills.

Table 5.1: Responses to how they acquire ICT skills for their classwork

	Frequency	Percent
Teach myself; Formal credit courses	1	0.4
Teach myself; Ask a colleague or friend	1	0.4
Formal credit courses; Training courses at home	2	0.8
Formal credit courses; As I do my assignments	2	0.8
Ask a colleague or friend; Training courses at home	2	0.8
Others	3	1.3
Teach myself; Training courses at home	5	2.1
Teach myself; other	5	2.1
Ask a colleague or friend; Formal credit courses	5	2.1
As I do my assignments	8	3.4
Teach myself; As I do my assignments	18	7.6
Teach myself	22	9.2
Ask a colleague or friend	29	12.2
Ask a colleague or friend; As I do my assignments	45	18.9
Teach myself; Ask a colleague or friend	86	36.1
Total	238	100

This issue is corroborated with a question within the questionnaire (**Section 2.17**). Using a 5-point Likert scale, respondents were asked to indicate their opinion whether ***'All needed software for my learning is available through my faculty'***. The result as indicated by the pie chart in **Figure 5.10** shows the majority of the respondents, 65% (33% strongly disagree and 32% disagree) disagreed with the statement that the faculty does support students with the needed software for graphic design education. This confirms that the university does not offer adequate formal opportunities for promoting computer skills in its ideation programme. Perhaps this can be attributed to the fact that 'ICT skills are not taught as a distinct activity ("just-in-case"), but are acquired "just-in-time," in the context of activity that is meaningful to learners' (UNESCO/COL, 2004:45, cited in Wilson-Strydom et al., 2005:2)

Table 5.2: Acquisition of needed software from their faculty

	Percent	Valid Percent
Strongly disagree	31.9	32.8
Disagree	31.1	31.9
Neutral	10.5	10.8
Agree	17.2	17.7
Strongly agree	6.7	6.9
Total	97.5	100.0
Missing	2.5	
Total	100.0	

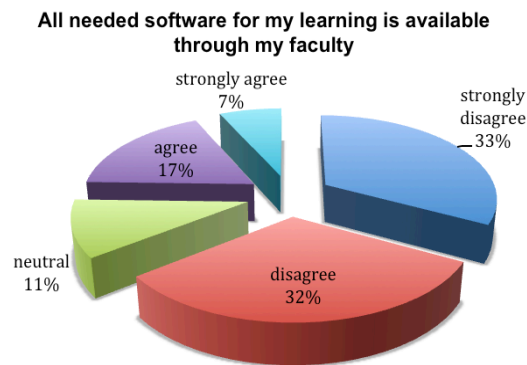


Figure 5.10: Acquisition of needed software from the faculty

5.2.8 ICT use for design education in ideation

The follow-up questions were to ascertain how often students use ICT for ideation in their everyday graphic design activities. Students were asked to indicate on a 5-point Likert scale, their use on seven ideation-related activities with the question: ***‘How often do you use ICT (including the Internet) for the following activities?’***. These activities were:

1. Use to sketch ideas for coursework.
2. Asking for help from lecturer.
3. Communicate with a colleague on academic activities.
4. Seek academic information using search engines.
5. Submit your homework and tasks.
6. Execute your final ideas after initial pencil sketches.

7. Research design ideas for your briefs and sketches.

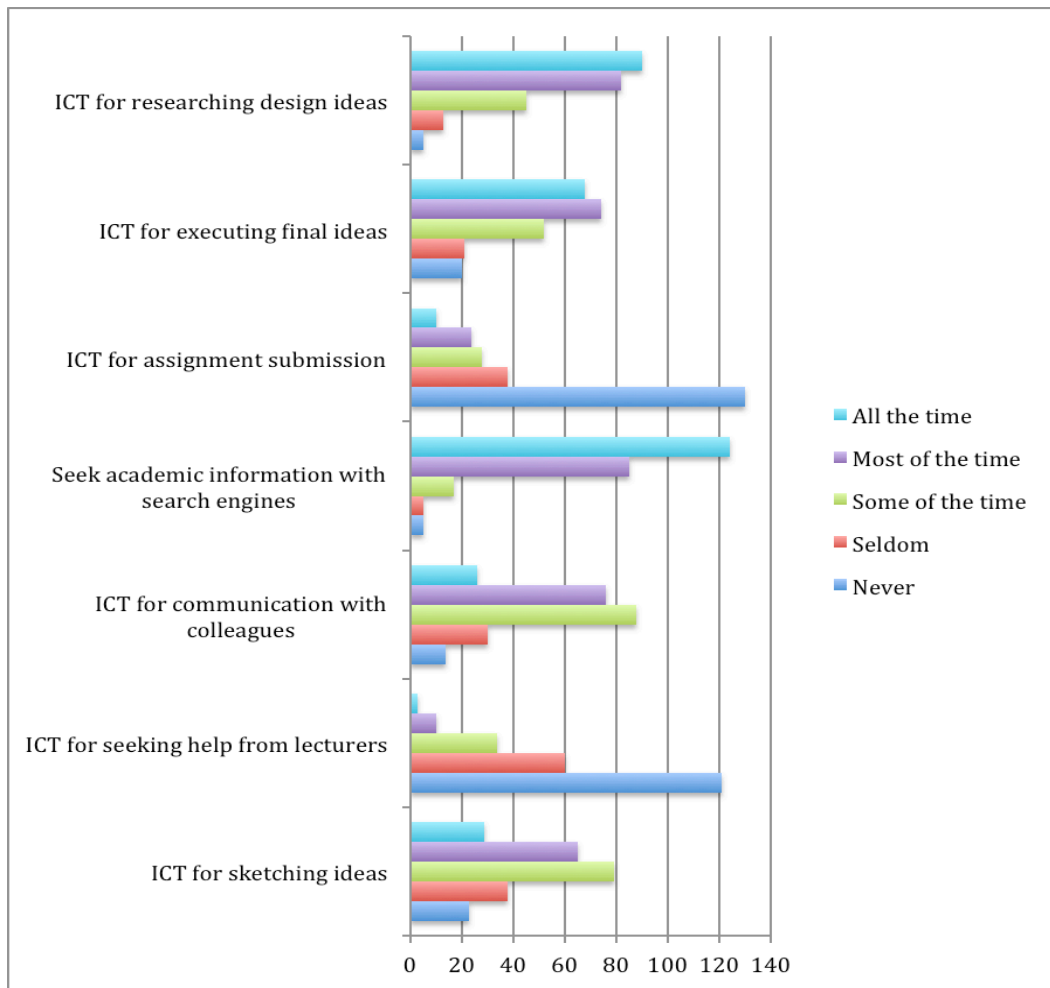


Figure 5.11: Responses on their use of ICT for various activities in their education

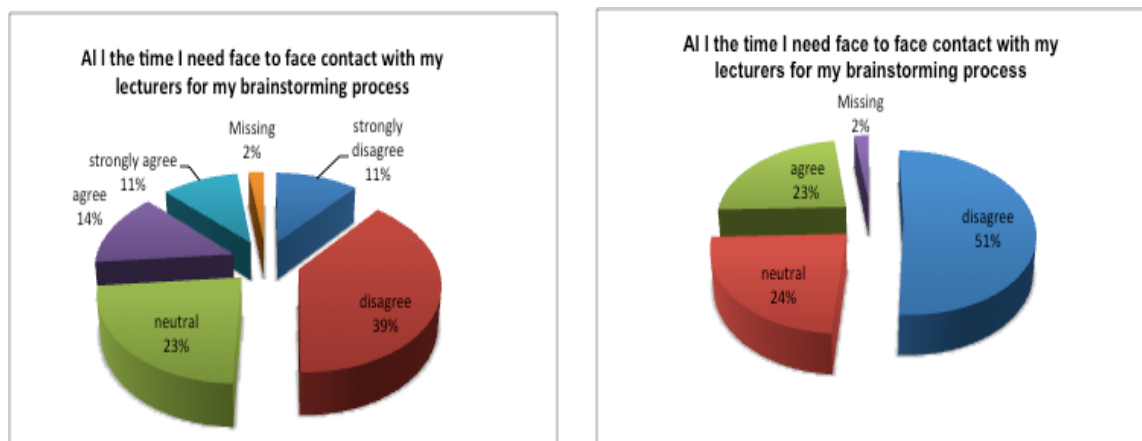
Results from the data (**Figure 5.11**) indicated that students do not use ICT to submit their work, nor do they communicate with their lecturers with ICT. However, they use ICT to seek academic information with search engines, **all the time** and **most of the time**. The majority of the students also research design ideas for their briefs **all the time** and **most of the time**, while the majority do sketches and execute their final ideas after initial pencil sketches **some of the time** and **most of the time**. From their responses, it is evident that the majority of the students use ICT for ideation in areas like sketching, seeking academic information using search engines, and researching for briefs; they also use ICT for executing their final works. It was also evident that the majority of students use ICT as a means of communication with colleagues for ideation activities. Perhaps, students discuss their briefs, share ideas and also do some collaboration during the brainstorming processes.

5.3 Perceptions of issues relating to methods and uses of ICT in ideation pedagogy (Section 2)

In this section, my focus is to show how ICT informs ideation by exploring some perceptions of the use of ICT by students within ideation activities for graphic design education. This section adopts the use of a 5-point Likert scale, allowing students to respond to thirty-one (31) questions with '**strongly agree (5), agree (4), disagree (3), strongly disagree (2) and neutral/undecided (1)**' to indicate their acceptance or not of the statement. These statements were designed to elicit their perceptions as to what might inform them concerning the use of ICT in their ideation process. Details of the findings from these questions are captured in the following section.

5.3.1 (Section 2.15): Face-to-face contact with lecturers

In this section, my aim was to establish the attitude of students towards brainstorming in having face-to-face contact in their brainstorming processes with their lecturers. Figure 5.12 illustrates students' attitudes towards face-to-face contact with their lecturers.



Figures 5.12a and 5.12b: Students face-to-face contact with lecturers for brainstorming

The results indicate a minority of the students (25%) desire face-to-face contact with their lecturers. The majority (50% after collapsing the results from the data) disagree with this statement, while 23% are unconcerned with the pedagogy of face-to-face interaction with lecturers during the brainstorming process. For such students, the pedagogy for having face-to-face interaction is not an issue during their brainstorming process. And at that stage in their studies, they feel they are capable of brainstorming and doing their ideation with little support from their lecturers

5.3.2 (Section 2.16): Computer technology with brainstorming

In this section, I attempted to establish if students brainstorm and sketch using computers since ICT and computer technology have become part of graphic design education. Moreover, the pedagogy of ideation in graphic design is silent on the use of ICT. Students were asked to respond to the statement that: ***‘Much of my brainstorming and sketching for my work is done on computer’***. From the responses (Figures 13 a & b), 33% of the respondents (the highest percentage) disagree with the statement. On collapsing the figures into ‘agreeing’ and ‘disagreeing’, it was realised that 44% actually disagree, with 38% agreeing with the statement, and 16% remaining neutral. Even though majority of the respondents disagree with the statement, the gap between agreeing and disagreeing does not indicate a significant mind-set and that the response is still positive in that students are using computers in their ideation process. This is corroborated by their responses to the following question in the next section (Section 5.3.3).

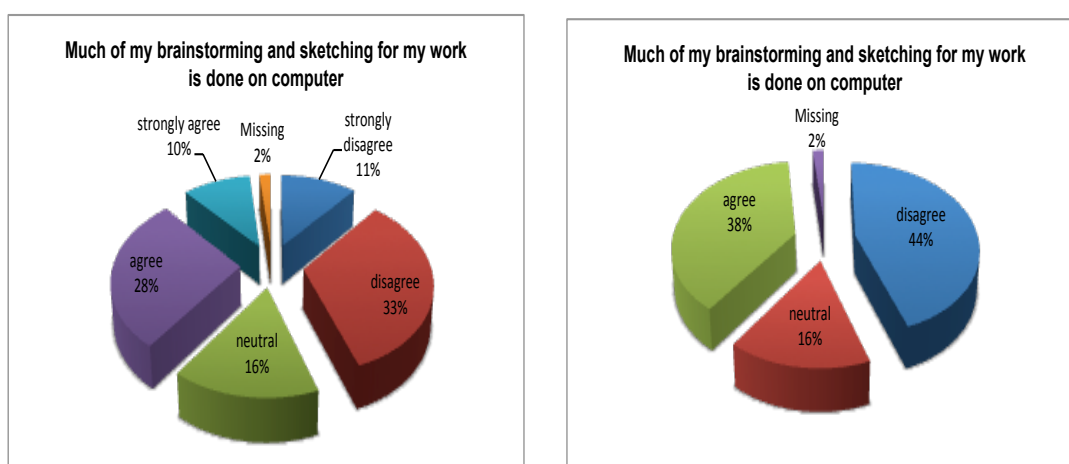


Figure 5.13a and 5.13b: Brainstorming and sketching for work done on computer

5.3.3 (Section 2.19): Computer technology with brainstorming

I needed to establish that students actually use computer technology in their ideation process with the statement: ***‘Usually I find sketching and brainstorming on the computer interesting and useful’***. This in a way was to corroborate the earlier question about ICT with brainstorming (Section 2.16). From the responses (Figure 5.14a), 38% of the respondents agree that using computer technology for their brainstorming and sketching is usually interesting and useful.

Indeed, 13% strongly agree, with 20% and 4% disagreeing and strongly disagreeing respectively to the statement. Interrogating these responses further, it is significant that 52% agree with the statement that they find sketching and brainstorming on computer useful, compared with 23% who disagree. This undoubtedly corroborates my earlier assertion that students are using computer technology for their brainstorming and sketching, even though 44% disagreed, compared with 38% in the earlier assertion in Section 5.3.2. Students can only find the technology useful and interesting and can comment as such if they are really using the technology. It is interesting to know that the same respondents are now finding sketching and brainstorming on computer interesting and useful.

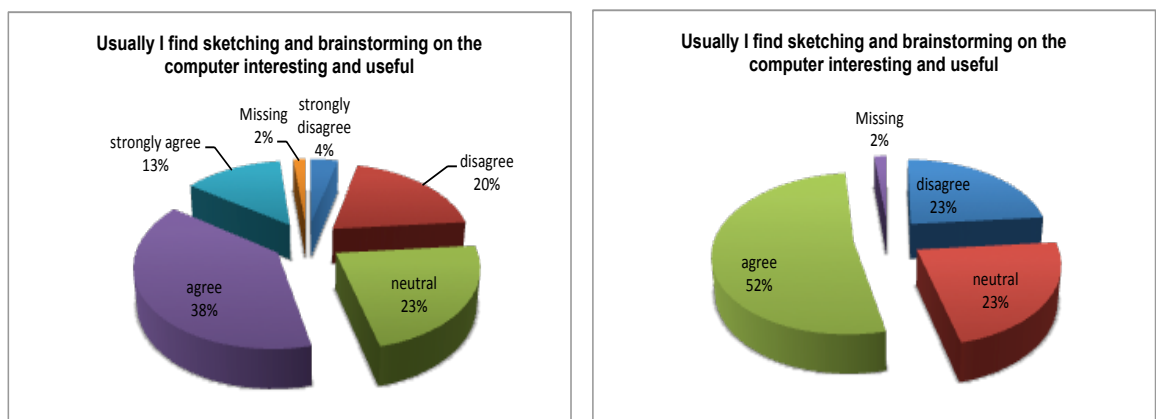
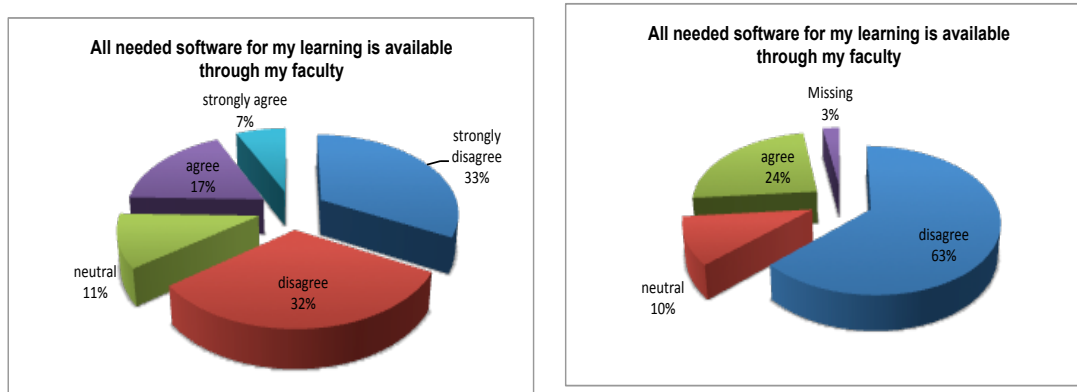


Figure 5.14a & 5.14b: Usefulness of work done with computers in ideation

5.3.4 Question 17: Needed ideation software for learning

This question further corroborates the issue of the absence of ICT and computers in the pedagogy of ideation in the university. Students were asked to indicate their response whether ***'All needed software for my learning is available through my faculty'***. The result as indicated in Figure 5.15 shows the majority of the respondents, 65%, disagreed (33% strongly disagree and 32% disagree). The result confirms the university's inability to offer adequate formal opportunities for promoting computer skills in its ideation programme. Perhaps this can be attributed to the fact that 'ICT skills are not taught as a distinct activity ("just-in-case"), but are acquired "just-in-time," in the context of activity that is meaningful to learners' (UNESCO/COL, 2004, cited in Wilson-Strydom et al., 2005:2).



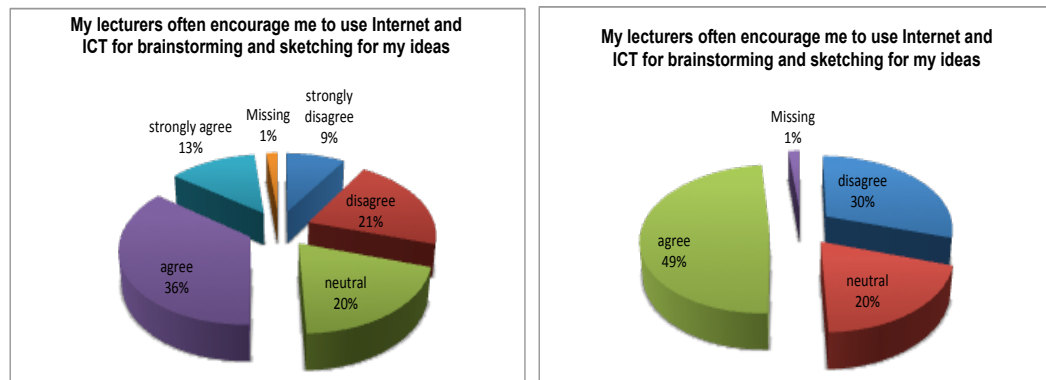
Figures 5.15a and 5.16b: Availability of software needed for learning in the faculty

5.3.5 Question 18 Lecturers' encouragement of ICT in ideation

If ICT and computers are not part of the pedagogy of ideation in graphic design, how do lecturers react to students and their use of computers? The following statement was to seek information about whether students' use of ICT and computer technology is influenced by lecturers' encouragement of the use of such technologies. Students' opinions were sought with the statement: ***'My lecturers often encourage me to use the Internet and ICT for brainstorming and sketching of my ideas'***. Figure 5.18 indicates that 13% strongly agree, 36% agree, 21% disagree, and 9% strongly disagree with the statement that lecturers often encourage them to use the Internet and ICT for their sketching and brainstorming ideas. Twenty percent of the respondents, however, indicated their neutrality to the statement.

Collapsing these responses to 'agree' and 'disagree', it can be deduced that 49% actually agree that their lecturers do encourage them to use ICT for their idea development, while 30% do not have the support of their lecturers in using ICT for brainstorming and sketching of ideas (Figure 5.16b). These disparities could possibly be the result of these students being taught by many lecturers in the graphic design curriculum. These lecturers might have their own reservations as far as the use of ICT and the Internet for graphic design education is concerned. Undoubtedly, the data from the responses do confirm that the majority of the students use ICT and the Internet in seeking information for idea development, and this is as a result of encouragement from their lecturers. While searching for ideas using ICT, it is possible students can be influenced by what they see on the Internet.

The possibility of trying some of these ideas and designs will also influence their operations when it comes to executing the final work. It is not surprising that students use ICT in executing their final works after initial sketches most of the time.



Figures 5.16a and 5.16b: Lecturers' encouragement to the use of Internet and ICT for brainstorming

5.3.6 Question 20: ICT integration assists in contacting colleagues

One of the key issues in design education is integration and discussion of ideas. Assignments are sometimes assigned to groups, and therefore students meet in the studio to discuss the work. Even when assignments are done individually, there is always the need for some discussion among students. This question was intended to see how students collaborate, even when they cannot meet physically on campus. From the statement: ***ICT integration assists me to contact my colleagues in order to solve some design problem when we cannot meet on campus***, 63% of the students (the majority) agreed that with ICT they could contact and collaborate with colleagues in solving some of their design problems, even when they could not meet on campus. Only 19% disagreed with that statement (Figure 5.17). What this implies is that ICT integration does assist students. However, the data do not indicate the form of integration nor do they indicate the extent of integration. Nevertheless, it underscores the issue that students do use ICT to communicate with a colleague on academic activities, as captured in **Question 14 (Section 1)**.

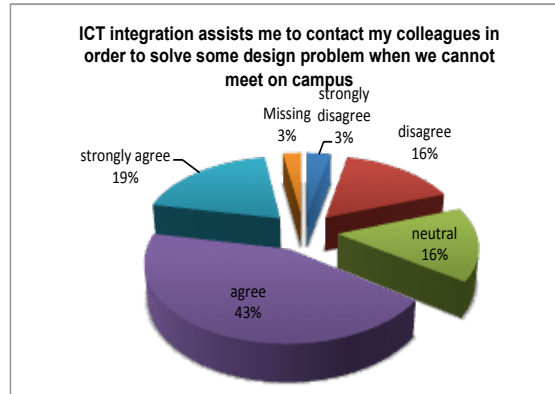
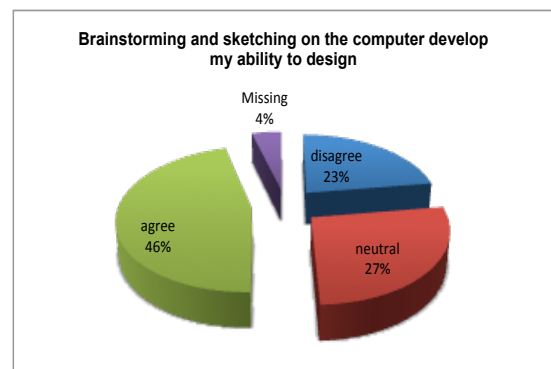
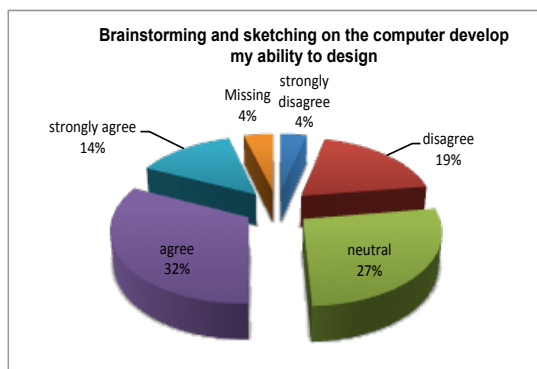


Figure 5.17: ICT integration assisting to solve design problems

5.3.7 (Section 2.22): ICT and ability to design

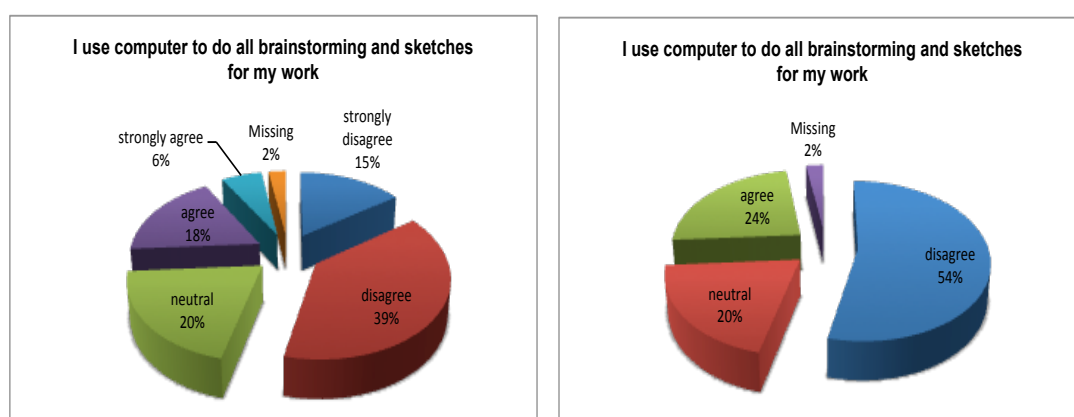
The issue becomes clearer and more interesting within this section when students are asked to comment on whether the involvement of computer technology in their ideation process develops their design abilities. Of the respondents (Figure 5.18), 46% were emphatic that brainstorming and sketching with computer technology developed their ability to design. Respondents who disagreed with the statement, however, comprised 23%, and were also emphatic that brainstorming and sketching with computer technology did not develop their design ability. However, the number of indecisive students increased marginally to 27%. What this data means is that students are emphatic that the use of computer technology develops their design ability. The perception that students avoid computer technology for ideation as per the pedagogy is therefore erroneous. As Yeoh (2006) posits in his study, ICT is now one of the major tools used in conceptualising, developing, and producing materials for graphic designers universally (Yeoh, 2006).



Figures 5.18a and 5.18b: Brainstorming and sketching on the computer develop my ability to design

5.3.8 Question 23: Use of computer for brainstorming and sketches

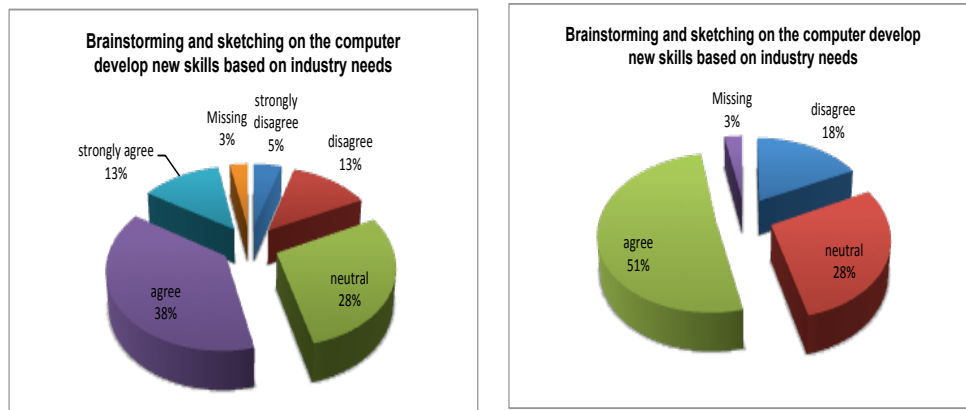
Despite the above discussion, I wanted to have emphatic response about students' use of ICT and computers for ideation. In response to the statement: ***'I use the computer to do all brainstorming and sketches for my work'***, 54% (the majority), as captured in Figures 5.19a and 5.19b are emphatic that they do not use the computer for all their work as far as sketches and brainstorming are concerned. Perhaps a blend of tradition and technology is what they mostly use.



Figures 5.19a and 5.19b: Use of computer for all brainstorming and sketching

5.3.9 (Section 2.24): ICT and new skills

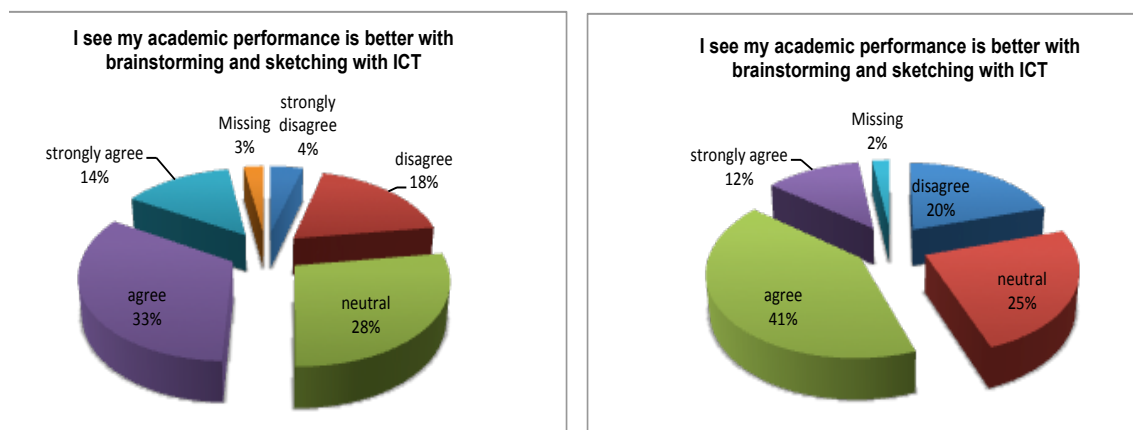
In this section, I try to explore the reason why students wish to resort to the use of computer technology even though the pedagogy of design education does not allow that in their studies. Respondents were requested to identify with the statement that ***'Brainstorming and sketching on the computer develop new skills based on industry needs'***. Data from the respondents (Figures 5.20a and 5.20b) reveal that 51% agreed with the use of computer technology in their ideation process since it helped develop skills needed in the industry. It must be pointed out that these students had been exposed to a semester's industrial internship, and therefore wished to be prepared to meet the challenges of industry when they finished university. The 18% who disagree with the statement might somehow have an experience of using computer technology for ideation and can make categorical statement to its usage for developing new skills for the industry. Yeoh (2006:167) states that computer technology is now being used for 'conceptualizing, developing, and producing materials for graphic designers universally'.



Figures 5.20a and 5.20b: Computers in ideation develop new skills for the industry

5.3.10 (Section 2.25): ICT with brainstorming and academic performance

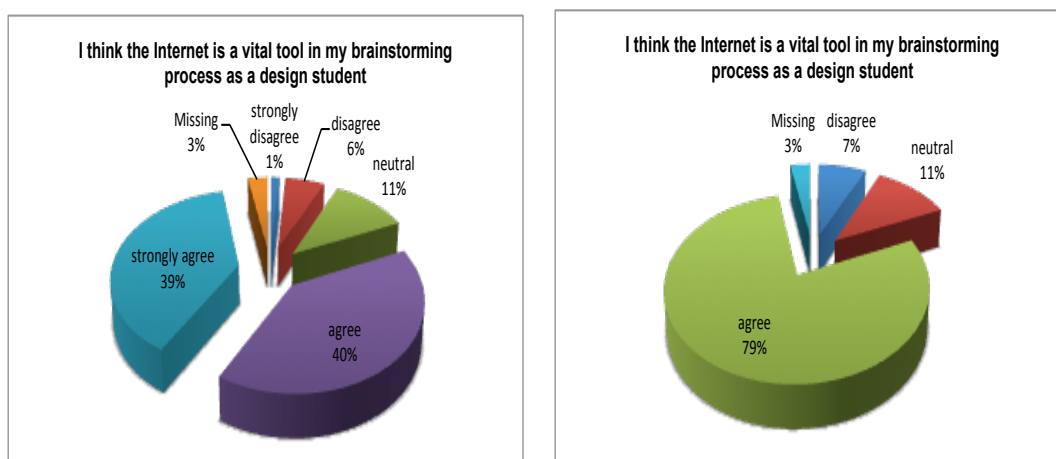
This section also explores further why students might resort to the use of ICT in their ideation process, despite the fact that the pedagogy does not allow that. The statement was to establish if by using ICT and computer technology, students' academic performance is improved. Respondents' views on the statement about their academic performance seem to be the driving force of students. Responses to the statement, ***'I see my academic performance becoming better with brainstorming and sketching with ICT'*** indicate that 14% strongly agree, with 33% agreeing (a total of 47%) that their academic performance has improved since they have developed ideation through ICT. Ironically, 28% remain undecided, with 22% who do not agree that ICT usage in ideation has improved their academic performance. However, with the majority of students considering their performance to have improved with ICT use, the tendency for students to continue to involve ICT in their ideation will definitely increase (Figures 5.21a and 5.21b).



Figures 5.21a and 5.21b: Computers in ideation help to improve the performance of students

The issue of students' abstaining from responding to the above question was envisaged. However there was the need to probe further to ascertain the veracity of their decision with further questions. Such students, and especially the 22% who do not see any significant change in their academic performance, might want to improve their learning skills in ICT and computer technology. The next section was designed to capture their perception of this situation, which leads to the second sub-question: **What informs the use of ICT by graphic design students in their ideation process?**

5.3.11 Question 26: Internet as a vital tool for brainstorming

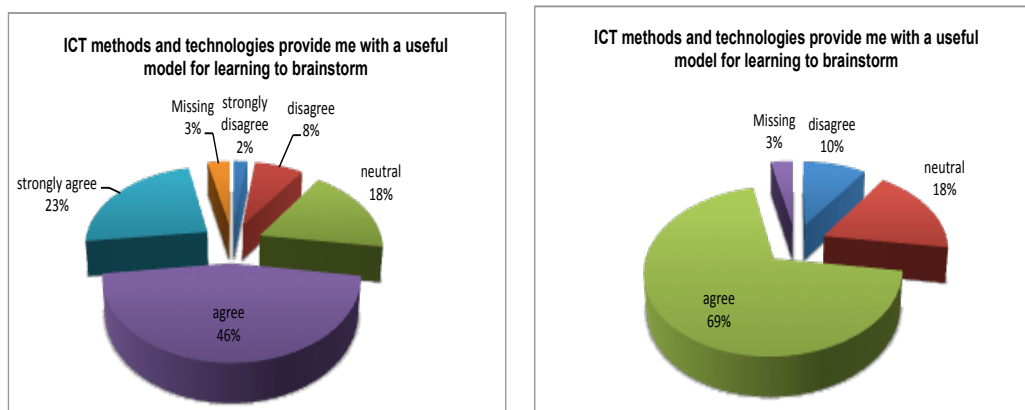


Figures 5.22a and 5.22b: Internet as a vital tool for ideation process

It is undeniable that design students are using computers for their main design process. However, the performance of students in ideation is something researchers are yet to determine. This study wanted to analyse students' opinions of the Internet in respect of the ideation process of brainstorming and sketching and how vital it is to their ideation process. From the statement: ***'I think the Internet is a vital tool in my brainstorming process as a design student'***, as many as 79%, the majority of respondents, agreed with this assertion (Figures 5.22a and 5.22b). This is against the backdrop that educators believe in and are adhering to the pedagogy that ICT with ideation should not be part of graphic design.

5.3.12 Question 28: ICT methods and technologies provide me with a useful model for learning to brainstorm

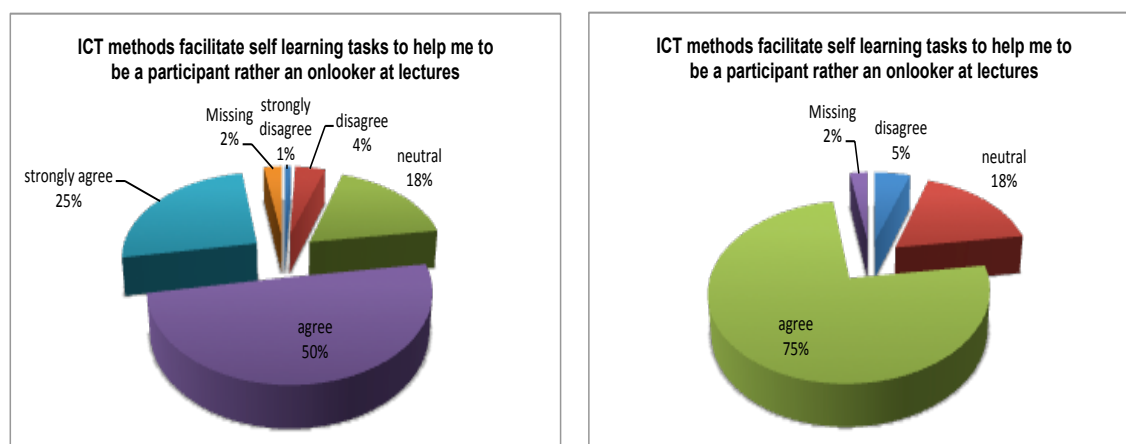
In response to the statement: ***‘ICT methods and technologies provide me with a useful model for learning to brainstorm’***, data gathered (Figures 5.23a and 5.23b) indicated that 23% strongly agree, with 46% also agreeing with the statement. This indicates 69% agree with the statement that ICT methods do provide them with useful models for learning to brainstorm. Only 10% of the respondents disagree with the statement.



Figures 5.23a and 5.23b: ICT methods as model for learning to brainstorm

5.3.13 Question 29: ICT for self-learning and participation

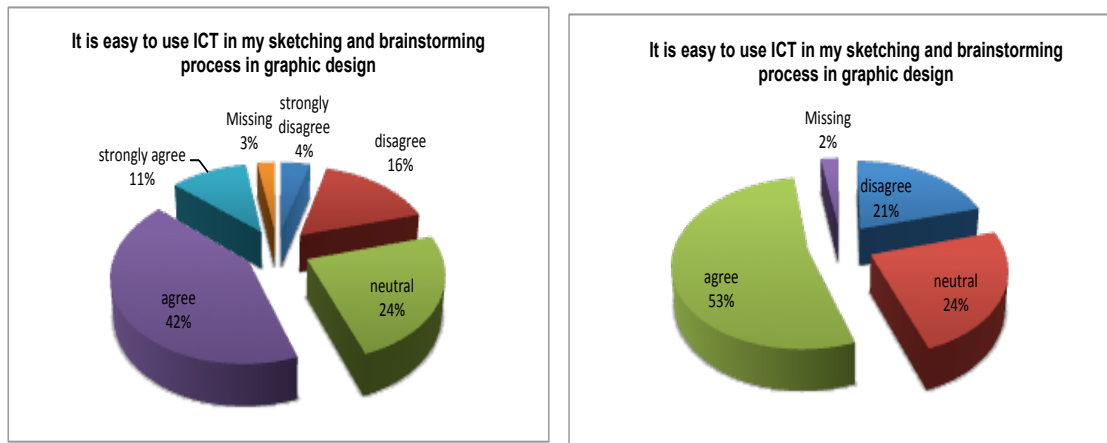
Moving further, there was the need to explore other activities that might prompt students to use ICT for ideation in their graphic design education. Apart from ICT's providing models for learning to brainstorm, I explore how ICT facilitates other forms of learning by students. Students were asked to comment on the statement: ***‘ICT methods facilitate self-learning tasks to help me to be a participant rather than an onlooker at lectures’***. Information from respondents (Figures 5.24a and 5.24b) indicated that 75% agree (25% strongly agree and 50% agree) that ICT methods facilitate self-learning tasks that enable them to be participants in design education.



Figures 5.24a and 5.24b: ICT facilitating students to become participants rather

5.3.14 Question 31: IT is easy to use ICT in my sketching and brainstorming process in graphic design

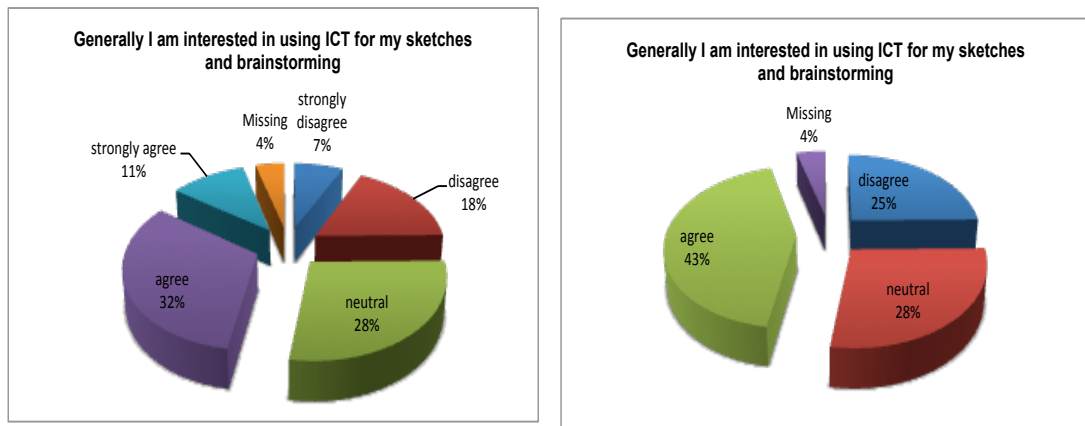
Another area that informed the use of ICT was that it is difficult to use ICT for ideation in graphic design. I tried in the study to interrogate this by asking students to comment on such perceptions. Responding to the statement: ***'It is easy to use ICT in my sketching and brainstorming process in graphic design'***, data available (Figures 5.25a and 5.25b) indicate that 53% agree (comprising 42% agree and 11% strongly agree) with the statement that they do not see any difficulty in the use of ICT for ideation. Students will definitely make use of ICT as they find it easy for their ideation.



Figures 5.25a and 5.25b: Easy use of ICT for ideation

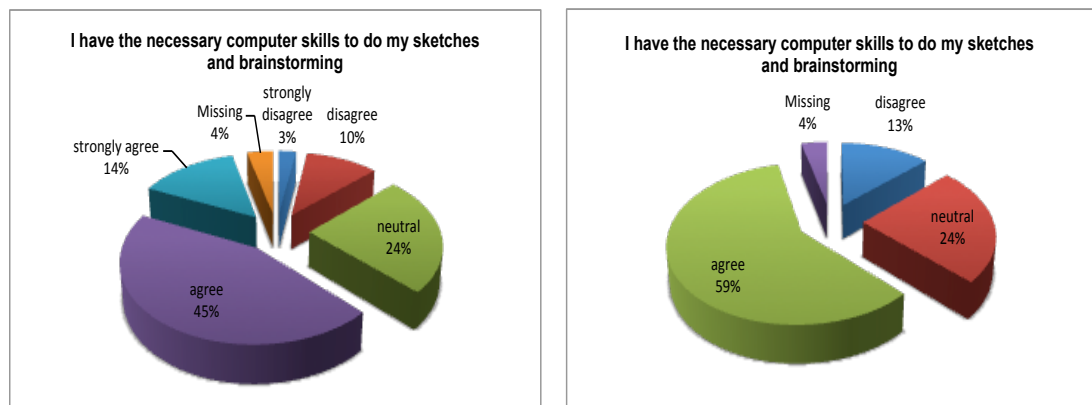
5.3.15 Question 32: Students' interest in ICT for ideation

It is one thing being able to use ICT easily, and another thing being interested in using ICT. It might be possible for students not be interested, since the curriculum does not consider ICT for ideation. This assertion was also explored in the study trying to elicit whether students are interested in using ICT for their ideation. Responses to the statement: ***'Generally, I am interested in using ICT for my sketches and brainstorming'*** (Figures 5.26a and 5.26b) indicate that 11% strongly agree, 32% agree, with 7% and 18% strongly disagreeing and disagreeing respectively.



Figures 5.26a and 5.26b: Students' interest in using ICT for ideation

5.3.16 Question 35: Necessary computer skills for sketching and brainstorming



Figures 5.27a and 5.27b: Students' ICT skills for ideation

One rationale for this study was the issue that students were using computer technology for ideation in graphic design. This is against the backdrop that the use of such technology is not part of the pedagogy of ideation in graphic design at the university. This question intended to solicit indications as to whether students actually had the necessary skills for ideation with computer technology. Responses from the statement: ***'I have the necessary computer skills to do my sketches and brainstorming'*** indicated that 59% have the needed computer technological skills, compared with 13% who do not have the skills to use computer technology for ideation (Figures 5.27a and 5.27b). Twenty-four percent, however, were neutral to the possession of such skills or not. No matter their reasons, there is no doubt that students go to any length to learn the skills of using computer technology for

ideation.

5.3.17 Question 36: ICT allows me to be very fast and fantastic in my sketches, thinking and brainstorming

Not only did the study indicate students' interest in the use of ICT for ideation, ICT also helped them in their thinking processes of ideation. In response to a statement: **ICT allows me to be very fast and fantastic in my sketches, thinking and brainstorming**, the majority of the respondents, 49%, agree, and 14% strongly agree or do agree, that ICT does help them to be very fast in their ideation process (Figure 5.28). It also allows them to be very fast in their thinking and sketching as far as ideation is concerned.

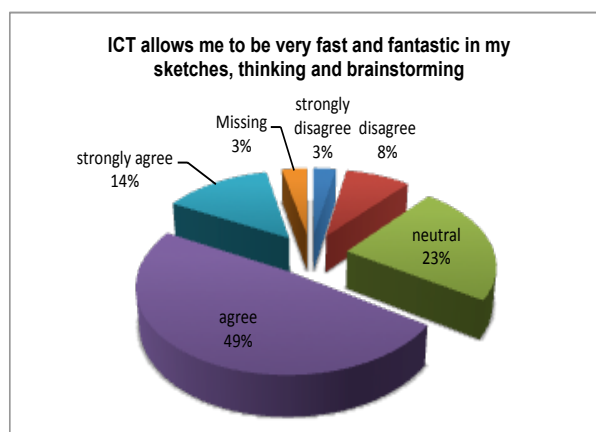


Figure 5.28: Students' performance in sketching and brainstorming with ICT

5.3.18 Question 37: I would like to develop my sketches, thinking and brainstorming skills using ICT

Based upon the fact that students see ICT helping them to be faster in their thinking and brainstorming processes, there was a further indication that students would like to continue to develop their ideation process with ICT. Students were asked to respond to the statement: '**I would like to develop my sketches, thinking and brainstorming skills using ICT**'. From the responses (Figure 5.29), it was evident that the majority agree with the statement. While 45% agree with the statement, 23% strongly agree, indicating a total of 68% that support the statement that they wish to develop their ideation with ICT. Ten percent (2% strongly disagree and 8% disagree) therefore disagree. This is an indication that students will always be inclined to use ICT for their ideation process, despite its not being part of the curriculum.

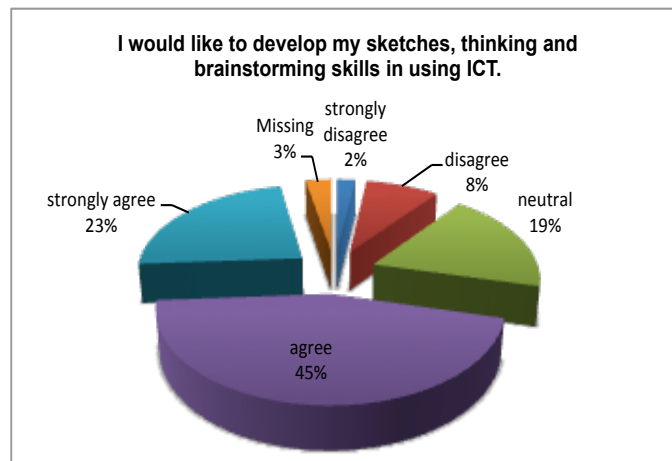


Figure 5.29: Developing ideation skills using computers

5.3.19 Question 38: I prefer to sketch, brainstorm and generate my ideas using ICT

This section was to further establish that students prefer the use of ICT for ideation in their graphic design education. Students were asked to comment on an emphatic statement about their preference: ***'I prefer to sketch, brainstorm and generate my ideas using ICT'***. Available data (Figure 5.30) indicate that 40% agree, with 17% strongly agreeing with the statement. These together comprise the majority of 57% being emphatic about their preferred choice of using ICT for their ideation, against 4% and 16% who strongly disagree and disagree respectively. This also indicates that such students have been using ICT for their ideation and might have seen how well it works for them, hence their decision to use ICT for such activities. There could also be the possibility of their marks improving with the use of ICT for ideation, and therefore they are eager to use ICT, irrespective of whether the pedagogy supports it or not.

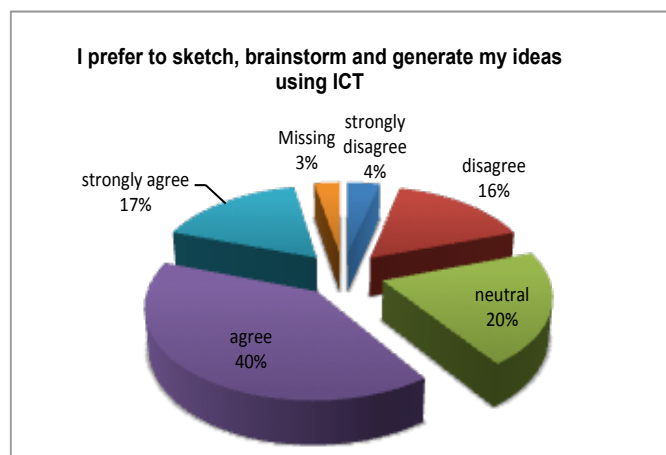


Figure 5.30: Students' preference for ideation using ICT

5.3.20 Question 39: ICT helps me to improve my idea development skills

Students' preference for the use of ICT for ideation might be the result of many factors. Some of these factors have already been speculated on in an earlier section. However, there was the need to establish some specific reasons. In this section, I tried to establish some of the reasons with the statement: ***'ICT helps me to improve my idea development skills'***. Data from the respondents (Figure 5.31) indicate that 25% strongly agree, with 48% also agreeing with the statement. These give a total of 73% of respondents who agree that ICT helps them to improve their ideation skills. Six percent disagree, while 1% strongly disagrees, indicating a total of 7% who do not consider that ICT helps them in their ideation. This situation could be one of the fundamental reasons for students' adoption of the use of ICT in their ideation process in contrast with the pedagogy of graphic design education.

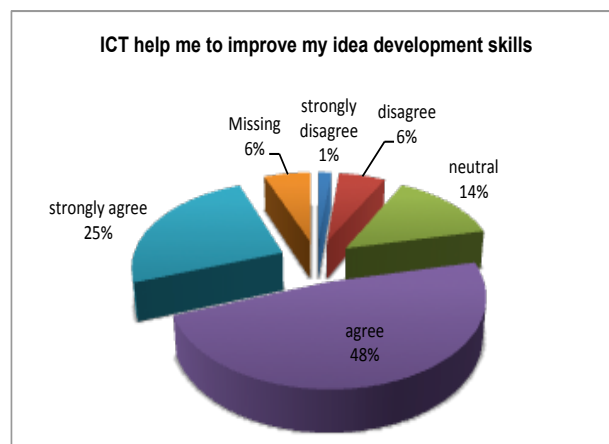
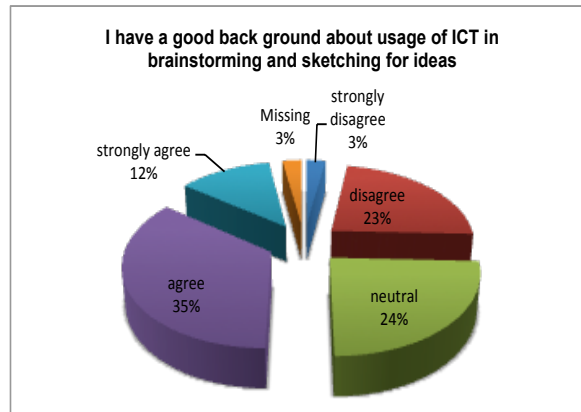


Figure 5.31: Improvement of ideation with ICT

5.3.21 Question 41: Background knowledge of ICT for use in ideation

This statement was intended to ascertain whether students were taking any lessons in ICT to assist in ideation, and also to corroborate their earlier statements on ICT knowledge. Responses from the statement: ***'I have a good background in the use of ICT in brainstorming and sketching for ideas'***, indicate that the majority of the students (35% agree and 12% strongly agree) have a good background knowledge and good ideas about the use of ICT for sketching and brainstorming for ideas (Figure 5.32). The majority of the students had earlier indicated that they had acquired their computer skills for ideation by teaching themselves, or by asking

friends and colleagues, or when they worked on their assignments (Section 5.2.5). Students' self-learning possibly makes them more eager to use ICT for ideation,



since students learn more and newer things every day.

Figure 5.32: Students' background knowledge of the use of ICT for ideation

5.3.22 Question 43: Difficulty in the use ICT ideation

Going further, this section explores students' perceptions on the difficulty of using computer technology for brainstorming. Students were asked to respond to their difficulty in the use of ICT for ideation. Data gathered (Figures 5.33a and 5.33b) indicated that 39% of the respondents do not have any difficulty in using ICT for ideation, while 35% find the use of ICT for ideation difficult. Twenty-two percent of the respondents were neutral in their responses. These figures are contrary to the data received in Question 31 (Section 5.3.17), where the responses contradict this statement.

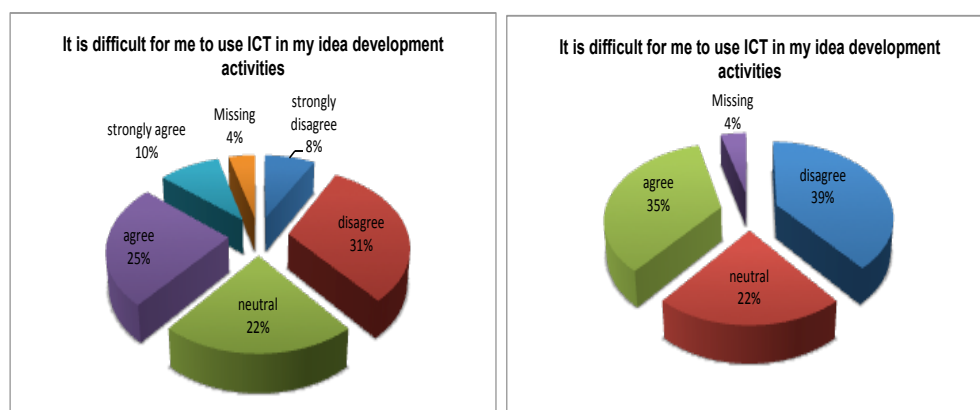
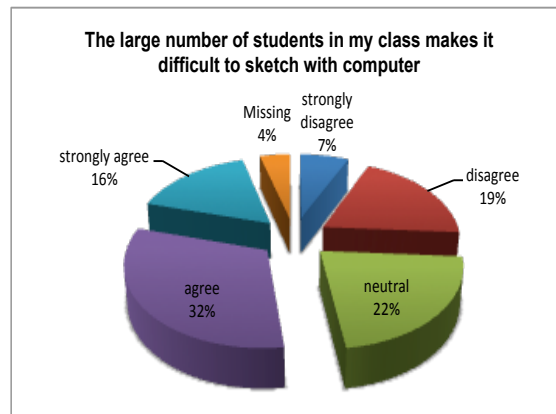


Figure 5.33a and 5.33b: Perceptions on difficulty with the use of ICT for ideation

5.3.23 Question 44: Large students number in class and difficulty in ideation with computer

One of the main issues confronting the case study is the issue of large numbers of students in a class. This case study had an average of 115 students in a class. My decision was to examine whether the issue of ideation by students' using computers affected the activities of students. This was also an attempt to triangulate the issue of students' using computers for ideation, compared with the pedagogy of graphic design. Data from the respondents indicated that while 32% agree with the



statement, 16% strongly agree, indicating a total of 48% who agree with the statement. This is in contrast with 26% of the students who disagree (7% strongly disagree and 19% disagree). However, 22% were neutral in their responses to the statement (Figure 5.34).

Figure 5.34: Large class size and difficulty in the use of ICT for ideation

5.3.24 Question 45: Recommendation for ICT for sketching and brainstorming

This statement is seen to be a plea and to establish students' perceptions on their expectations of lecturers concerning the use of ICT for ideation. There was overwhelming evidence that students want to use ICT for ideation. While 30% strongly agree, 41% agree (a total of 71% agreeing) with the statement: ***'I would like my lecturers to encourage the use of ICT in the sketching and brainstorming process'***. A total of 9% (2% strongly disagree and 7% disagree) disagree with the statement, with 15% remaining neutral in respect of the statement (Figure 5.35).

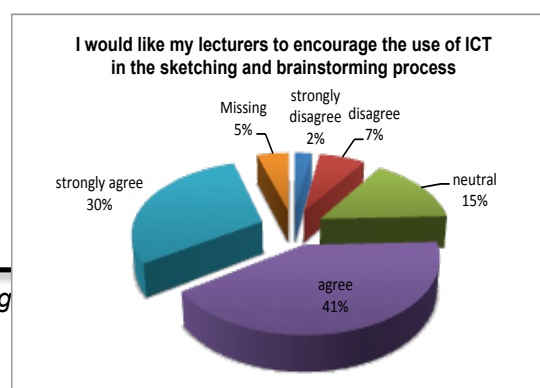


Figure 5.35: Lecturers' encouragement for the use ICT in ideation

In answering the question: ***'What informs the use of ICT by graphic design students in their ideation process?'*** data from these responses indicated that so long as students can manage ideation with computer technology, they are not bothered by interaction with lecturers during the brainstorming process; that students are using computer technology for their brainstorming and sketching, since they find sketching and brainstorming using ICT interesting and useful; and that brainstorming and sketching with computer technology does develop their design ability. Therefore their responses were emphatic on their use of computer technology.

This situation gave credence to one of the hypotheses of this study: that students will show some tendency to side step and will distort the process of ideation as long as educator/learner interaction in ICT and studio activity is not guaranteed. It can therefore be deduced from the findings of this section, that any notion of students' avoiding computer technology in ideation as per the pedagogy of graphic design are erroneous. Furthermore, students use computer technology in their ideation process since it helps develop the skills needed in industry. The majority of students also see their performance improving with ICT use. Consequently, there is a tendency for students to continue to use ICT in their ideation process. Thorsteinsson et al. (2010) are convinced that students' motivation for the use of ICT in ideation does affect their ability to find new ideas. With ICT and innovation education, students find ideation activity easy and can quickly brainstorm for new ideas. As Yeoh (2006:167) remarks, 'Computer technology, made possible by hardware and software, is now one of the major devices used in conceptualizing, developing, and producing materials for graphic designers universally'. Moreover, 'many aspects of graphic design education are visually-based and the computer has become an important tool in the design processes' (Yeoh, 2002:4).

From the responses, it can be realised that student access to ICT is high in the department. These findings also corroborate those of Yeoh (2002), that students see ICT in graphic design as a technological tool that will benefit their long-term profession and cannot ignore it (Yeoh, 2002). They use these technologies as conceptual tools in their ideation process in graphic design education. The

profession is no longer limited to books, posters and advertisements, but now includes motions graphics and interactive media, and digitisation (Meggs & Purvis, 2012:iv). These students see themselves being trained for a profession that has become technologically driven (Jonson, 2004; Jonson, 2005; Tan & Melles, 2010). Their dependence on ICT for their work is of great significance. Even where access and use of ICT seems to be difficult, students will go all out to make use of the technology and are even willing to teach themselves so they can use it in their ideation process. Where the university does not offer adequate formal opportunities for acquiring computer skills, they are prepared to sacrifice their own time and money to acquire such skills. This can also be attributed to the fact that 'ICT skills are not taught as a distinct activity ("just-in-case"), but are acquired "just-in-time," in the context of activity that is meaningful to learners' (UNESCO/COL, 2004, in Wilson-Strydom et al., 2005:2). For students, the use of ICT in the pedagogy of ideation is paramount, indispensable and strongly linked to their survival in the graphic design industry. It is time that educators take a fresh look at the curriculum, since learning in the digital age requires a review of activities and pedagogies for today's graphic design challenges. In the current context, where there seems to be no pedagogical link with ICT, there may be situations where students will undoubtedly resort to issues that might not be pedagogically aligned with their training.

5.4 What informs the use of ICT by educators in the pedagogy of ideation in graphic design?

This section also reports on the findings from the questionnaire for lecturers. As with the questionnaire for students, this questionnaire asked participants to respond to 64 questions divided into four sections. **Section 1** (questions 1 – 14) captures '**Access to ICT and the Internet**'; **Section 2** (questions 15 – 48) relates to perceptions of issues relating to methods and uses of ICT in ideation pedagogy; **Section 3** (questions 49 – 53) comprises open-ended questions eliciting respondents' opinions about ICT with brainstorming and sketching, and **Section 4** (questions 54 – 64) relates to general information about respondents.

The findings from the questionnaire are in response to part of the sub-question that concerns educators: ***What informs the use of ICT by educators in the pedagogy of ideation in graphic design?*** The aim is to find out whether educators in the

teaching process of ideation in graphic design are using ICT, their perceptions on ICT in ideation, as well as issues relating to methods, and how these affect the pedagogy of ideation in graphic design. I shall begin by reporting on the findings from Section 4, covering general information about respondents.

5.4.1 Age, experience and qualifications (Section 4)

This section reports on the findings with regard to lecturer profiles, their age, academic qualifications and years of experience. The number of lecturers in the department is sixteen. At the time of the research, two were on sabbatical and therefore were officially not part of the department. This puts the population of the study in respect of lecturers at fourteen (14). Based on the purpose of the study and the number of lecturers, all 14 lecturers were used in the sample size.

5.4.1.1 Age and experience

Table 5.3: Age of respondents

Age	Frequency	Percent
-	1	7.1
26-30	2	14.3
31-35	3	21.4
41-45	2	14.3
46-50	2	14.3
Over 50	4	28.6
Total	14	100

In this section, I report on the profile of the respondents as captured from the data gathered. Of the 14 lecturers in the department, 11 are above the age of 30. Indeed, eight are over the age of 40, with one person refusing to divulge his/her age. It is significant to note that older people might have issues with ICT in graphic design, since older people were trained in an era when ICT was not a component of graphic design.

Five (5) of the lecturers have been teaching graphic design for less than six (6) years, five (5) also have been lecturing between 6 – 10 years, with the remaining four (4) having over ten (10) years' lecturing experience in graphic design in higher education. The majority of lecturers in the department have been lecturing for more than five years in higher education.

Table 5.4: Respondents' years of experiences in teaching

Years of experience	Frequency	Percent
1-5 years	5	35.7
6-10 years	5	35.7
11-15 years	1	7.1
21-25 years	1	7.1
Over 25 years	2	14.3
Total	14	100

In respect of their degrees or qualifications, the majority of lecturers (10) have a master's degree in their specialised areas of study, with one person having a PhD. The remaining three have a bachelor's degree (honours) in graphic design. Two are senior lecturers, ten are lecturers and the remaining two are assistant lecturers.

Table 5.5: Respondents' level of education

Academic qualification	Frequency	Percent
Bachelor's	3	21.4
Master's	10	71.4
Doctorate	1	7.1
Total	14	100

5.4.1.2 Nature of courses taught

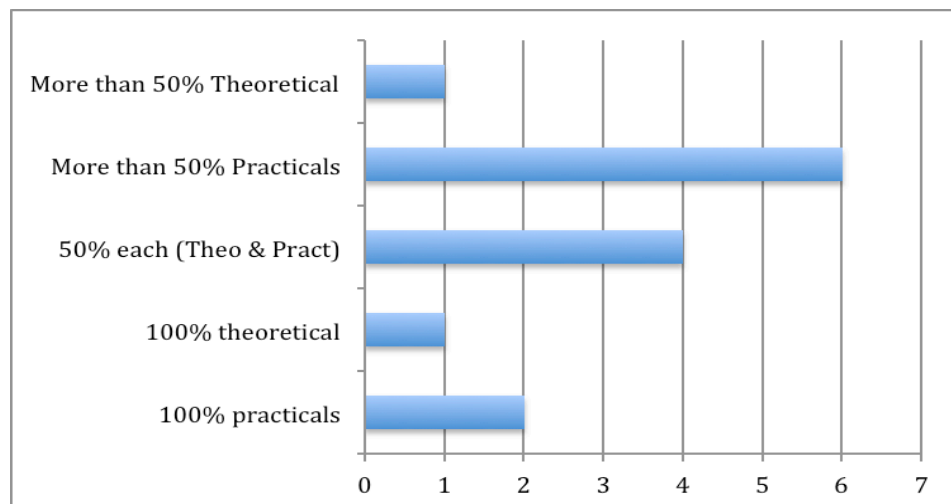


Figure 5.36: Nature of courses taught by lecturers

The study is about exploring the issue of ideation in graphic design; phenomenon that is basically an activity of practical issue. My concern therefore is to look at the nature of the course taught by the lecturers in the department. From the data (Figure 5.36), it can be seen that only one lecturer teaches a course that has a 100 percent theoretical component. One other lecturer also teaches a course that has more than a 50 percent theoretical component, but that includes some practical activities. The rest of the lecturers teach courses that have more than a 50 percent practical component. This situation stems from the fact that graphic design is mainly a project-based course that reflects real-life situations, rather than a subject-based programme. It is expected that educators will involve tool-oriented methodologies to teach these courses to reflect the real-world scenario. These tools, as expressed by Reffat (2008), should help create the 'ideal curriculum ... that merges information technologies into existing courses more progressively' (Reffat, 2008:900).

5.4.1.3 Class sizes

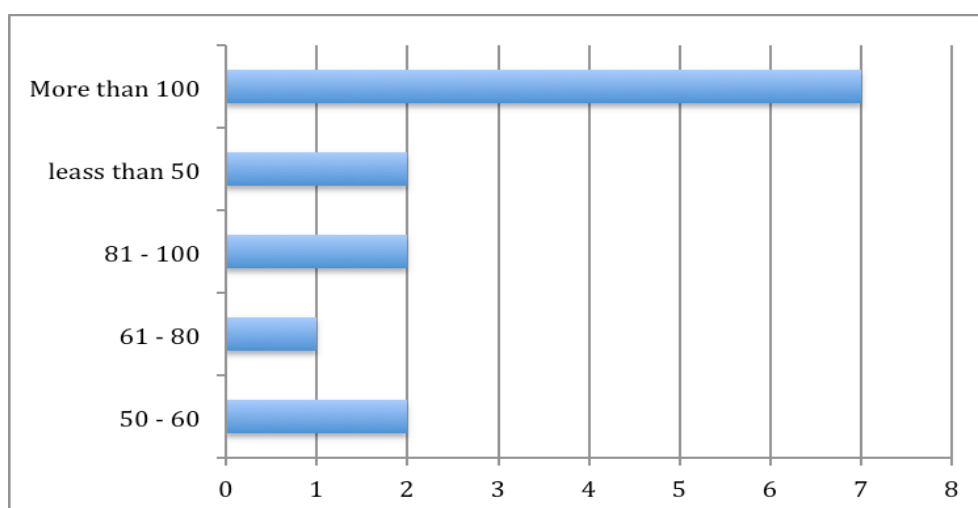


Figure 5.37: Number of students in a class for respondents

The number of students in a particular course is of significance in this study, since the size of the classes has a significant bearing on the activities of ideation, which is the major focus of the study within the department. From the responses (Figure 5.37), it can be noted that only two lecturers teach classes with fewer than 50 students. The rest have class sizes of 50 or more students, with seven lecturers having more than 100 students in a class. The project-based nature of the graphic design programme requires the educator to have close contact with students for direct supervision. This means there should be smaller numbers of students in the

class, especially since the majority of the courses taught are mainly practical. This makes for direct and better 'master-student' interaction as per the pedagogy of graphic design. Observation during the study revealed that the large class sizes definitely created problems with student-lecturer interaction during classes, especially where most of the courses were practical rather than theoretical.

5.5 Access to computers by lecturers (Section 1)

To establish whether educators in the teaching process of ideation in graphic design use ICT or not, there was the need to establish if lecturers do own and use ICT devices and whether such devices are also connected to the Internet. From the data, it appeared that a significant number of lecturers own various ICT devices: 13 have laptops; a significant number, 11, also own desktops which are connected to the Internet; while 7 have cell phones that are connected to the Internet. What this data means is that all the respondents have access to ICT devices that are connected to the Internet. It shows the lecturers are capable of using ICT when it matters.

Table 5.6: Respondents' access to computers

Which of these device(s) do you have linked to the Internet?		
	Frequency	Valid Percent
All 4	1	7.1
Desktop	1	7.1
Desktop, laptop,	2	14.3
Desktop, laptop, cell phone	4	28.6
Desktop, laptop	2	14.3
Laptop	1	7.1
Laptop, cell phone	3	21.5
Total	14	100.0

5.5.1 Allowing ICT for design education in ideation

The next section explores whether lecturers allow the use of ICT by students in their ideation activities. In the question: '**How often do you allow the use of ICT by students in your teaching?**' it was realised from the responses (Figure 5.38), that six of the educators do allow the use of ICT by their students most of the time, whereas four indicated that their students are allowed the use of ICT all the time for their ideation activities. None of the educators indicated 'never' in their responses,

although one educator stated ‘some of the time’ and another ‘seldom’.

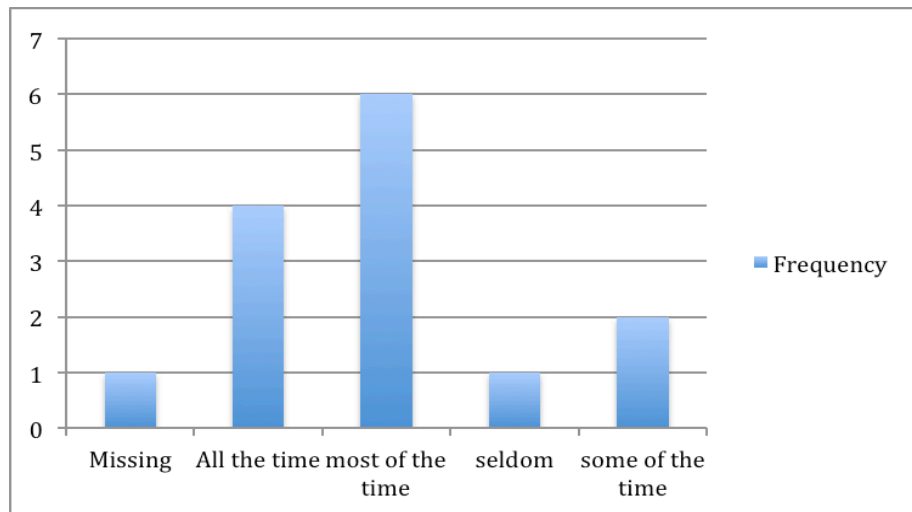


Figure 5.38: Lecturers' responses to allowing ICT for ideation by students

5.5.2 ICT allowed for design education in ideation

Moving further, I needed to know the areas where educators allow students to use ICT and also the various ICT devices that are allowed. Available data (Figure 5.39) from the responses to the question indicate that students, for their final work, mostly use computer technology, followed by brainstorming with the Internet.

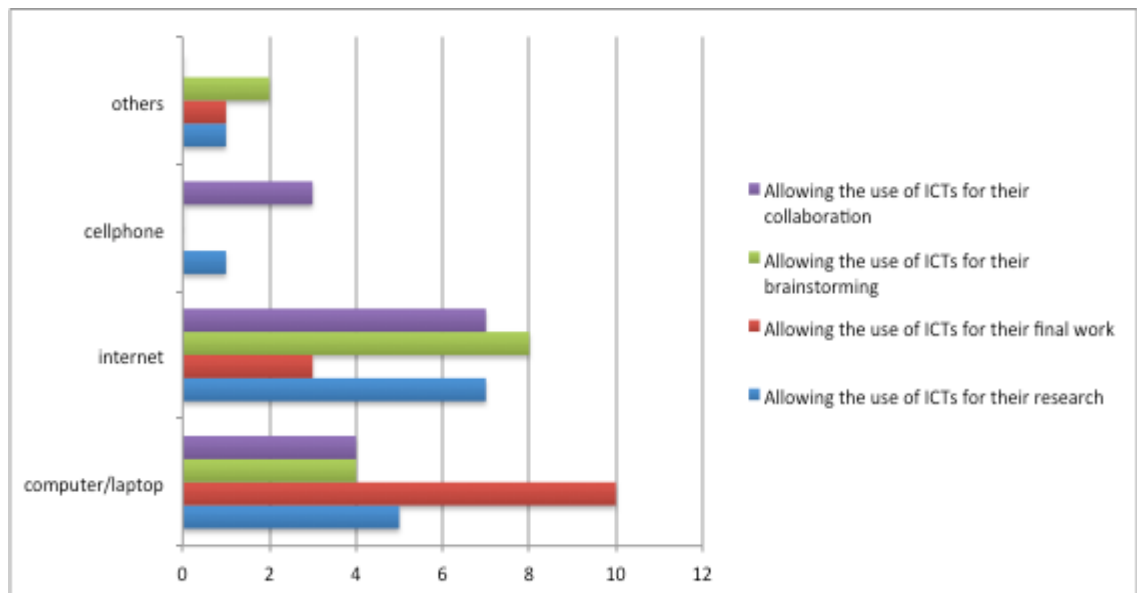


Figure 5.39: Allowing the use of ICT for activities in graphic design education

5.5.3 ICT for students' design exercises

While there are some indications of educators' allowing students to use ICT for their graphic design activities, it is imperative to explore further the various exercises for which students are allowed to use ICT. Respondents were therefore asked to indicate the types of ICT they allow students to use. For the question: '**What types of ICT are students allowed to use in your teaching and for what purpose?**' there were four academic areas where lecturers were asked to provide answers. These are brainstorming, collaboration, researching for ideation, and executing the final work. Responses from the lecturers indicate that five of the lecturers allow students to use ICT for all the four indicated areas. Two allow its use for brainstorming, research, and final work; and research, brainstorming and collaboration (Figure 5.40).

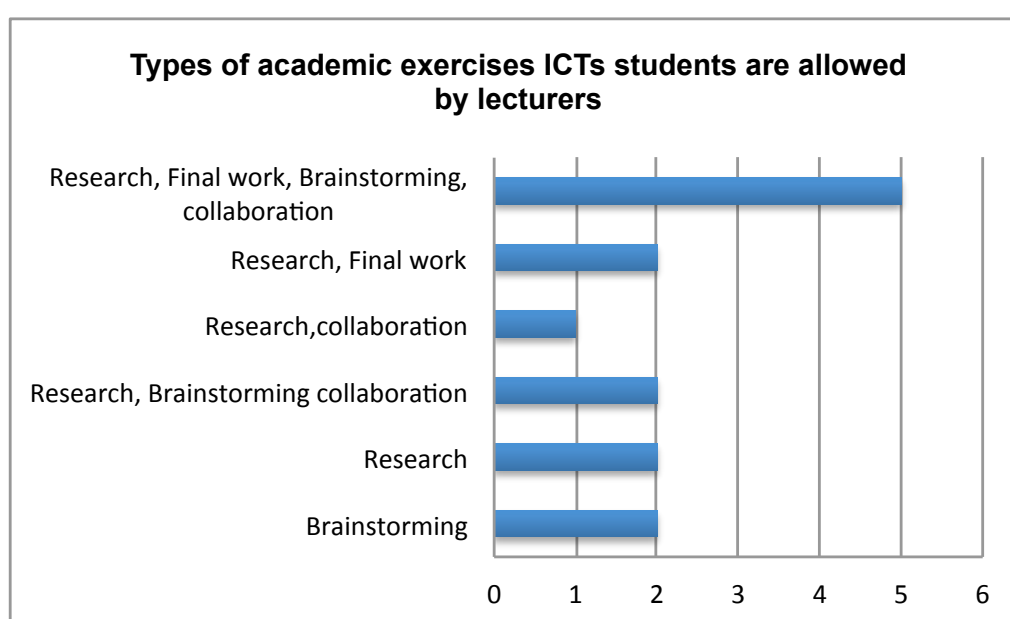


Figure 5.40: Academic activities for the use of ICT by lecturers

5.5.4 Use of ICT and the Internet by educators

Beside educators allowing students to use ICT for some of their graphic design activities, I am also interested in what educators themselves do with ICT as far as graphic design and ideation are concerned. Respondents were therefore asked to indicate their use of ICT with certain graphic design activities. Using a 5-point Likert scale, respondents were asked: '**How often do you use ICT (including the Internet) for the following activities?**' The activities include,

1. Provide instructions
2. Assess my students' work
3. Direct and provide instructions to individual learners
4. Organise communication between students
5. Collaborate with other designers (local and international)
6. Prepare my traditional lectures
7. Direct presentations

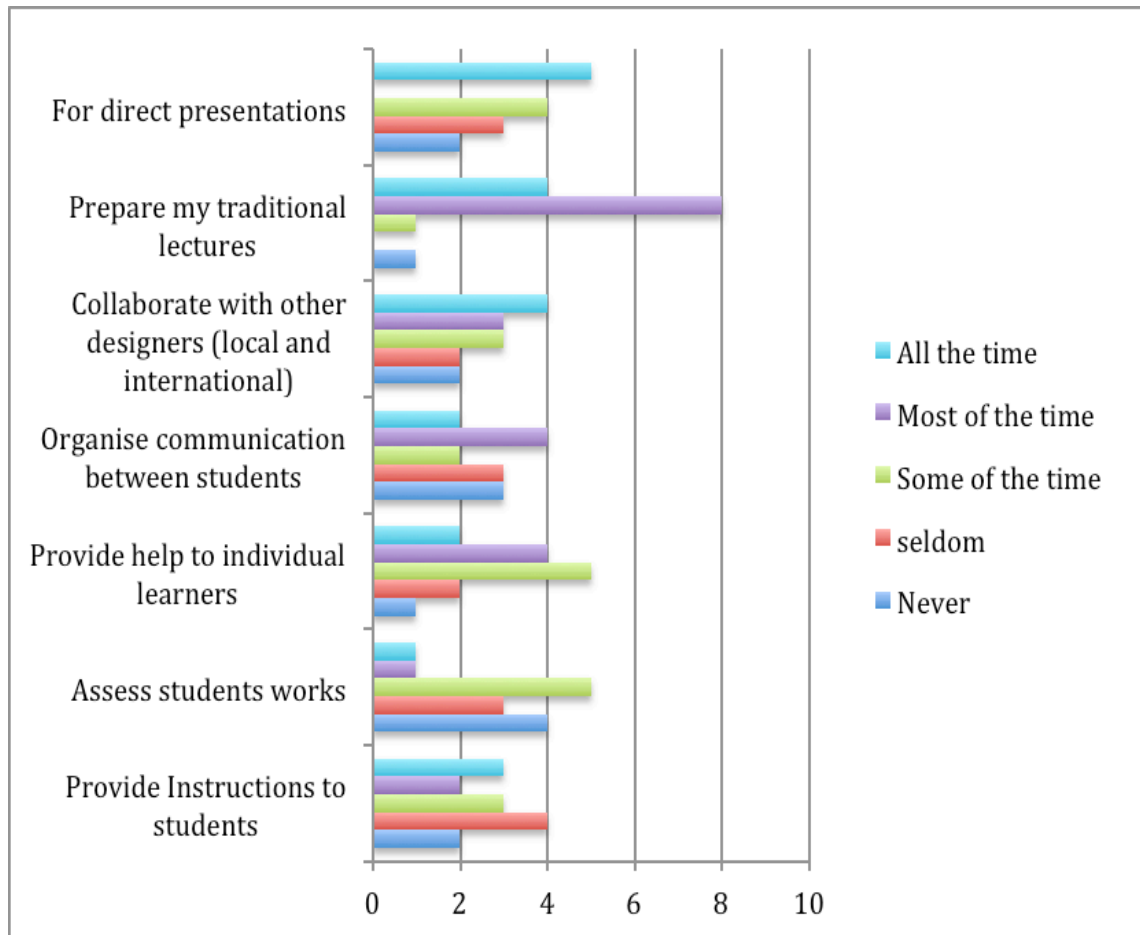


Figure 5.41: How lecturers allow ICT for graphic design by students

From the data, it can be realised that lecturers use ICT in their preparation of traditional lectures most of the time (**Figure 5.41**). The majority (six) seldom or never provide instructions using ICT. A few of them rather assess students' work all the time and most of the time with ICT. However, five do assess students' work some of the time. It is heart-warming to realise that the majority use ICT to organise communication among students. The majority do use ICT to collaborate with other designers, both local and international. Moreover, most of the educators do use ICT

for direct presentations in class (five 'all the time' and four 'some of the time'). These include giving lectures and showing students work for discussions. Four of the educators 'seldom' use ICT for instructions to students, whereas three provide instructions to students 'all the time'. Three of the respondents also use ICT to provide instructions to students 'some of the time'. An issue of non-innovation in education with regard to ICT can be observed since the majority do not provide instructions to students using ICT.

5.6 Perception of issues relating to ICT for ideation activities (Section 2)

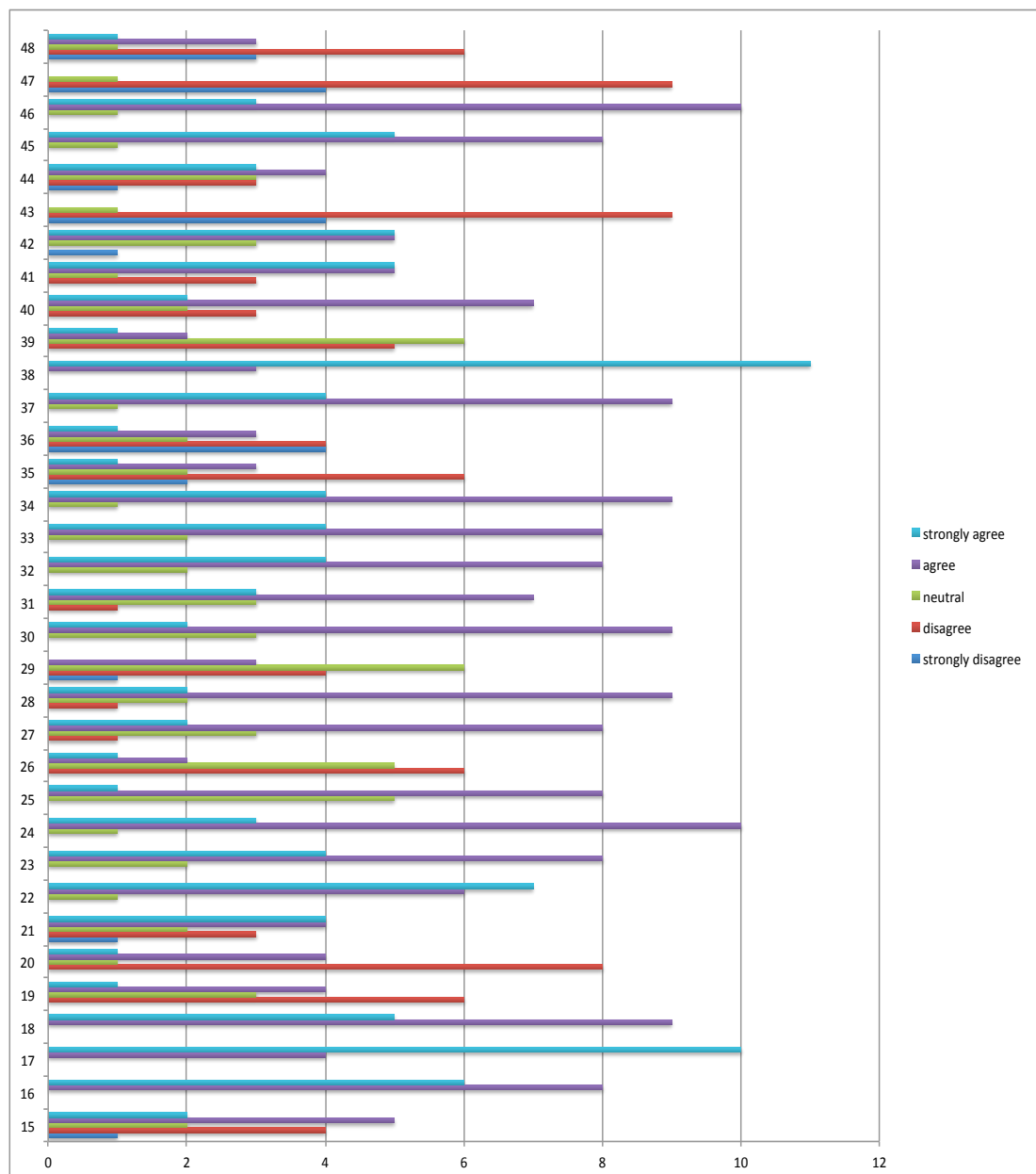


Figure 5.42: Lecturers' responses to ICT for various ideation processes

In Section 2 (Appendix A) of the questionnaire, I was interested in exploring how educators, by their responses, see ICT in ideation in current graphic design education. This is in relation to their perceptions of issues relating to methods and uses of ICT in ideation pedagogy. Using a 5-point Likert scale, the lecturers were asked to respond to statements based on the use of ICT in ideation. These responses are captured in Figure 5:42, and which will be used to explain the findings as captured from Questions 15 to 48 (Lecturers Questionnaire in Appendix A).

5.6.1 ICT integration and face-to-face contact in idea development

Lecturers were asked to comment on whether ***‘the use of ICT integration can replace face-to-face contact to develop idea development in graphic design education’ (Q. 15)***. From the data, five of the respondents really agree, while two strongly agree with the statement. On the other hand, four of the respondents disagree, with one person strongly disagreeing. Two of the respondents, however, remain indecisive. This situation reflects on the *impasse* in academe about ICT and graphic design education. If seven of the respondents (the majority) do agree that ICT can replace face-to-face contact, it gives an indication of the readiness of educators to approach ideation with technology.

5.6.2 Direct face-to-face contact with students on idea development

Moving further, the lecturers were asked to comment on direct face-to-face contact with their students during teaching. Responses from the statement: ***‘During my teaching, I always have direct face-to-face contact with my students on idea development’ (Q. 16)*** indicate that all the lecturers do have direct face-to-face contact with students during idea development in class. Indeed, while eight of them agree, six of them strongly agree. This situation seems to be the ideal for the pedagogy of ideation, especially when student numbers are lower. The case being explored is, however, not the typical idea situation of low numbers.

5.6.3 ICT integration enables collaboration

Lecturers were also asked to comment on whether, in their view, ICT enables collaboration between institutions. This was to corroborate the responses obtained from Question 14(6). Data from the responses indicate that ten of the lecturers strongly agree, with the remaining lecturers also agreeing with the statement that ICT integration really enables collaboration between institutions. This

information also corroborates their earlier responses in **Section 5.4.5**, where the majority do use ICT to collaborate with other designers, both locally and internationally.

5.6.4 ICT integration increases the quality of teaching ideation

On the issue of enhancing the teaching of ideation, nine respondents agree with the statement that: ***'ICT integration increases the quality of teaching idea development in graphic design'*** (Q. 18). The five remaining respondents also strongly agree with the statement, indicating that all the respondents believe that ICT really does increase the quality of teaching ideation. The majority of the lecturers had indicated earlier in **Section 5.4.2** that they allow students to use ICT for brainstorming processes.

Yeoh (2002) posits that students are able to develop and expand their creative capacities during the design process when ICT is involved. Furthermore, computer technology aids in the exploration and development of students' design ideas by improving the quality of their initial sketches into a tangible format. According to Yeoh (2002), computer technology is even capable of replacing or alternating some of the students' manual skills by letting them discover new interpretations and expressions of ideas with technological tools (Yeoh, 2002:161). Educators will therefore have to consider the pedagogy of ideation, in respect of graphic design and the issue of ideation. Thorsteinsson et al. (2010) are convinced that students' motivation for the use of ICT in ideation does affect their ability to find new ideas. With ICT and innovation education, students find their ideas easily and quickly.

5.6.5 ICT integration for teaching in ideation and the rate of interaction

This part of the study explores how ICT can facilitate the integration of teaching idea development. Respondents were therefore asked to comment on whether ***'ICT integration can be used for on-campus teaching in idea development in order to increase the rate of interaction'*** (Q.22). From the data, seven respondents strongly agree with the statement that ICT integration can be used to increase interaction in idea development. Six also agree, with one respondent being indecisive. There is no disagreement on this question, and therefore it can be said that almost all respondents are in agreement with the statement.

5.6.6 ICT integration and the issue of large number of students in ideation

One of the problems of graphic design education in developing countries is the issue of large numbers of students in a class. My study is to explore how the use of ICT can help manage such situations. In this section, respondents were asked to comment on whether ***'ICT integration can help me to control and manage a large number of students in the idea development'*** (Q. 24). Data gathered indicated that ten people agreed, and three people strongly agreed, whereas one person was undecided. Once again none of the respondents seems to disagree on this statement.

5.6.7 On-line experience against traditional teaching methods in ideation

On the issue of online experience, I tried to ascertain respondents' views whether they have such experience in graphic design ideation. From the statement; ***'on-line experiences are seen to be better than traditional teaching methods in idea development'*** (Q. 25), eight of the respondents agreed with the statement, one strongly agreed with the remainder, five, being indecisive. Once again none of the respondents disagreed. It is interesting to see the majority of respondents agreed that online experience was as good as that of traditional methods, but there was no indication of its use.

5.6.8 Digital experience against traditional teaching methods of ideation

Not only is online experience important, I also wanted to explore how experience of specific ICTs impact on the teaching of ideation. From the statement, ***'Digital experiences are better than traditional teaching methods in idea development'*** (Q. 26), six respondents disagreed with this statement, five respondents were indecisive, two agreed, while one strongly agreed. The majority of the lecturers disagreed that digital experience is better than traditional teaching methods of ideation. This data seems to contradict the earlier assertion that online experience is viewed to be as good as traditional methods. However, digital experience might come from whatever software one is accustomed to and might reflect what educators have been used to.

5.6.9 ICT offers a better opportunity for individualised instruction

As a result of large numbers of students in classes, this section was aimed at identifying how ICT offers some opportunity in teaching ideation in graphic design. Lecturers were asked to comment on the statement: ***'The use of ICT in teaching offers a better opportunity for providing more individualised instruction'*** (Q.

27). Data from respondents indicated that eight respondents agreed with the statement, two strongly agreed, one disagreed, and three remained indecisive. It is interesting to note that the majority agree that ICT offers a better opportunity for providing more individualised instruction for ideation.

5.6.10 Digital methods and students' ability to create new ideas

Ironically, data from respondents on the statement: '**Digital methods can develop students' ability to design and create new ideas in the ideation process**' (Q. 28), show that, nine agreed, two strongly agreed, one disagreed, while two remained indecisive. Earlier in **Section 5.5.8**, the majority disagreed that digital experience would help in teaching methods of idea development. Perhaps this could inform educators' own attitudes towards the use of digital technologies. Moreover, educators' lack of innovation with regard to teaching with ICT could also be an influential factor. Hence, the result of educators' not realising any potential of enhancing teaching methods in ideation with ICT.

5.6.11 ICT assisting motivation and collaboration in group-based projects

In respect of the issue of motivating collaboration in group-based projects, respondents were asked to comment on the statement: '**ICT assists in terms of motivating and structuring collaboration when applied to group-based project methods of teaching**' (Q. 30). Data indicated that the majority (nine respondents) agreed. Moreover, two of the respondents strongly agreed, with three being indecisive. This data could be tied to Question 32. The finding is presented in the next section.

5.6.12 ICT allow collaboration in group-based project work

This section explores another aspect of collaboration. From the statement: '**ICT allows my design students to collaborate in group-based project work**' (Q. 32), eight agreed, while four strongly agreed. However, two remained indecisive. Data from **Q. 30** and **Q. 32** indicate that educators attest to the fact that ICT helps in assisting students when it is applied to group-based project methods of teaching. Since graphic design is about group-based projects and also real-world situations that require close collaboration, the use of ICT in the methodology of teaching ideation needs to be considered in the pedagogy.

5.6.13 ICT and model of self-lifelong learning in ideation

To corroborate **Sections 5.5.11 and 5.5.12**, respondents were asked to comment on the two preceding statements: ***‘ICT provides a useful model of self-lifelong learning for graphic design students in idea development’ (Q. 33)*** and ***‘ICT can enhance the teaching of idea development in my course’ (Q. 34)***. Data from Question 33 indicated that eight respondents agreed, while four strongly agreed, indicating overwhelming approval that ICT truly provides a useful model of life-long learning, especially for graphic design students in respect of ideation. However, two of the respondents were indecisive.

5.6.14 ICT can enhance the teaching of idea development in my course

Respondents were later asked to comment on the statement that ***‘ICT can enhance the teaching of idea development in my course’ (Q. 45)***. Eight of the respondents agreed, five strongly agreed, with one being undecided. This response, together with earlier ones, is a clear indication that educators view ICT as strong support for the teaching of ideation in graphic design, especially for group collaboration, working in groups and formulation of concepts in their activities. Unfortunately, these are not captured in the pedagogy of graphic design with regard to ideation.

5.6.15 ICT does not adequately assist in teaching idea development

Educators were further asked to comment on whether ICT assists in teaching ideation. From the statement: ***‘ICTs do not adequately assist in teaching idea development in graphic design’ (Q. 35)***, it was revealed that whereas six respondents disagreed with the statement, two strongly disagreed. Two of the respondents were indecisive about the statement, three agreed, with one strongly agreeing with the statement. These data indicate that the majority of respondents agree that ICT adequately assists them in teaching ideation for graphic design.

5.6.16 Enhancing the teaching outcomes in graphic design through ICT

Not only was I interested in ICT’s assisting teaching ideation, but was also interested in whether ICT also enhances the teaching outcomes. In reaction to the statement: ***‘ICT can effectively enhance the teaching outcomes in graphic design as far as idea development is concerned’ (Q. 46)*** ten respondents agreed, three respondents strongly agreed, with one being indecisive. None of the respondents disagreed with this statement. From these responses, it can be deduced that educators believe and agree that ICT actually enhances the teaching outcomes of ideation in graphic design. This revelation supports the idea that ICT offers the

support needed for collaboration by students in their group activities (Spendlove & Hopper, 2004; Page et al., 2005; Margolin, 2007). For this to be achieved, Page et al. (2005) suggest the use of problem-based learning (PBL) that involves goal setting, planning, execution, evaluation, and the problem's being anchored in an authentic setting. This is particularly important as PBL provides an environment for students to investigate issues that address real-world problems while integrating subjects from different disciplines of the curriculum (Page et al., 2005).

5.6.17 Blend of on-line and face-to-face teaching for teaching ideation

While educators do accept ICT as supporting the teaching of ideation in graphic design, it is important to explore how it can be applied to the current situation. From the statement: '***A blend of on-line and face-to-face teaching is the best current option for teaching idea development in my class***' (Q. 38), eleven of the respondents strongly agreed, while three also agreed. There was no disagreement with the statement. Even though the data indicated that educators do support ICT, they prefer a blend of on-line and face-to-face pedagogy in the teaching of ideation. This data also underscores the findings of Bender and Vredevoogd (2006), who advocate a pedagogy that supports blended learning that will seek to improve large studio courses, since studios are unique learning environments embedded in a historical context. Bender and Vredevoogd (2006:119) argue:

Integrating blended learning with the traditional studio can increase student learning. Moreover, technology provides several benefits to students. It can be used to present information in a variety of formats, accessible at all times, and leaving live class time for the intellectual communications that only people can provide.

Bender and Vredevoogd (2006) therefore advocate the infusion of the traditional studio with on-line technologies that will serve as best practices.

5.6.18 Studio activities and on-line delivery of idea development

Another aspect of the findings was educators' reactions to studio activities and on-line education with ideation in graphic design. Respondents were asked to comment on the statement: '***Studio activities cannot be delivered on-line when it comes to idea development***' (Q. 43). From the data, nine of the respondents disagreed; four strongly disagreed, with one respondent agreeing with the statement. With classes becoming larger each day and studio size shrinking, an approach to blended learning can help to ease the pressure of educators concerning idea development.

Educators in developing countries should therefore consider blended learning when integrating ICT in the pedagogy of ideation.

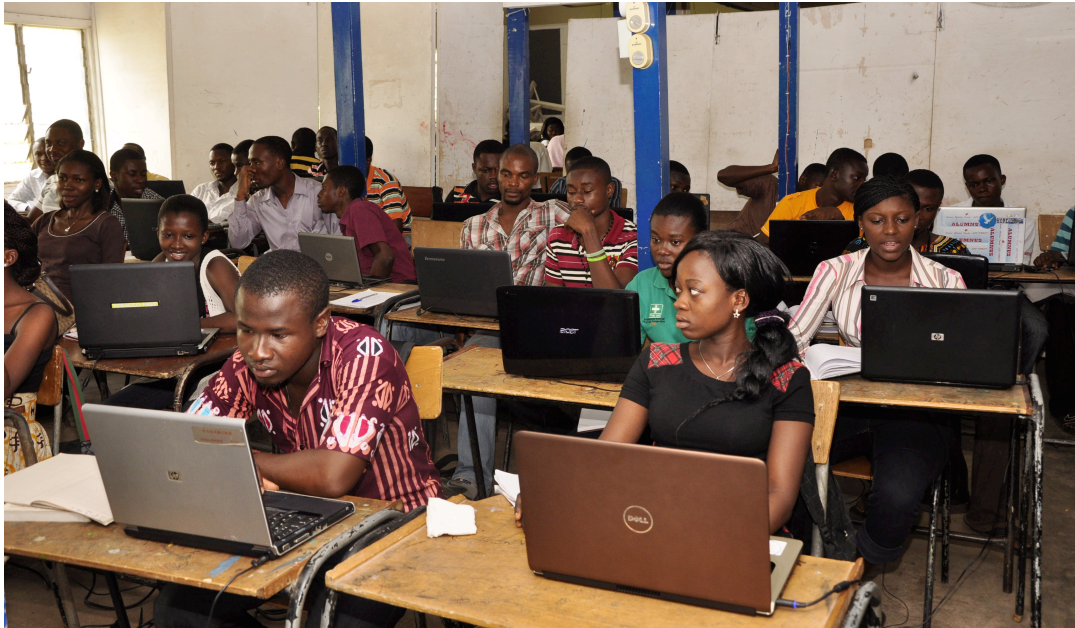


Figure 5.43: Classroom/studio setting with students during ideation class

5.7 Implications of the data for the study

Findings from the responses indicate sufficient evidence to show that students view ICT as something indispensable in their ideation process. Lecturers also appreciate the effectiveness and use of ICT, especially for large classes. They agreed that ICT could help in managing these large classes (**Section 5.6.6**). ICT offers better opportunities for providing more individualised instruction to students (**Section 5.6.9**), yet lecturers are reluctant to accept the use of ICT as a result of some prejudice. Students envisage ICT as becoming a reliable partner in the design process as discussed in the literature, and desire its use in the ideation process. Some of the ways in which they use ICT for ideation might seem unorthodox for the pedagogy of ideation in graphic design. For such students, ICT is seen as encompassing integration, decision support and design tools (Reffat, 2008), as well as digital ideation tools (Stones & Cassidy, 2010). They will therefore resort to the use of ICT in every way possible that will enhance their ideation activities. This might not be the conventional method for graphic design, but as long as the students are exposed to technology and numerous issues support its use, students will find some space in their activities to use them. Even though the teaching of ICT and its related skills might not be part of the curriculum of graphic design in developing countries, as far as this case study is concerned, students will learn by themselves and use

ICT, no matter how differently their lecturers might see it. These issues are the bedrock of various tensions and contradictions when viewed from the lens of activity theory, which will be discussed in detail, especially within the analysis of the qualitative aspect of this study. Wang (2009:208), in exploring the benefits of ICT for students, remarks that, for enthusiast students, ICT 'will help transform them from being passive and uncritical receptacles of past knowledge into being active and creative learners'.

For lecturers, the perception of ICT in ideation might be positive. They have clear views about what ICT can and does bring into the teaching and learning of ideation in graphic design. Some of their concerns appear to be genuine. This, however, does not discount the issue that ICT cannot be used as a tool for which learners can rely on for developing ideas as far as design process is concern (Thorsteinsson et al., 2010:315). Indeed, the difficulties of ICT integration into design education stem from teachers' inability to use ICT creatively within the pedagogy (Wang, 2009). Studies have shown that ICT with ideation is possible digitally, through Virtual Reality Learning Environment (VRLE) technology (Thorsteinsson et al., 2010:314). The possibility of using the VRLE tool for ideation in many graphic design projects (Thorsteinsson et al., 2010:314) should guide lecturers to be innovative in integrating ICT in ideation in graphic design. The successful integration of all these and in the pedagogy really depend on the role of educators in their approach to ICT. Educators have the responsibility to manage and enable the context of teaching and learning, when it comes to ICT in graphic design education.

CHAPTER SIX

HOW ICT METHODS AFFECT IDEATION PEDAGOGY

6 Introduction

The previous chapter (Chapter 5) was devoted to discussion about the initial findings of the quantitative aspect of the study. This was to establish whether ICT is truly being used in the teaching and learning process of ideation in graphic design. In this section, attention is focused on the details of the qualitative analysis. The aim is to provide a focused discussion of the data collected to address the research questions:

- *What happens to the teaching and learning of ideation in graphic design when students begin to use ICT in direct contrast to traditional graphic design pedagogy?*
- *How do the ICT methods affect the pedagogy of graphic design in a developing economy?*

The emphasis is to answer the research sub-questions:

- How does the introduction of ICT affect the teaching and learning of ideation process in graphic design?
- What are the disturbances, tensions and distortions that characterise the introduction of ICT in the process of ideation in graphic design education?

The discussions emanate from the integration of the qualitative data collected from interviews, documents, and observation. Even though there seems not to be a standard format for reporting case studies (Merriam, 1998, in Creswell, 2007:195), my aim is to create structures that reveal the themes, as captured in the analysis. The intention was not to attempt direct aggregation, but rather use categorical aggregation, where the issue-relevant meaning is discussed, as and when it emerges (Creswell, 2007:163). In some instances, the discussions will dwell on categories and themes that might appear in situations that will draw meanings relating to other areas. These themes, as they emerged, were viewed through Activity Theory as a lens in the study and also linked with the reviewed literature, which gave credence to the concept of 'multi-strategy research', 'integrated methods', 'multi-method research' and 'combined methods' research (Denscombe, 2007:107).

From the study, and through observation, there was ample evidence of students'

being eager and actually using ICT in the ideation process for their projects and assignments. Overtly and covertly, lecturers also encouraged the use of ICT, even though there were situations of negativity, creating contradictions, especially during studio activities. These were viewed through the lens of the framework of Activity Theory (as described in Chapter 4), which was used to examine the interaction between educators and learners in their use of ICT. These interactions revealed themes of contradiction as a result of pedagogical disorientation through the various influences of ICT, which will be discussed in the sections that follow.

6.1 Contradiction of activities

Issroff and Scanlon (2002) note a situation of contradictions as central to Activity Theory, when external influences change elements of activities causing imbalances between them. According to Issroff and Scanlon (2002), a contradiction could occur when a new tool is introduced into a community, which does not have any rules of practice to make effective use of that tool. Contradictions manifest themselves as problems but can also be a source of development. Such is the situation when ICT is introduced into the pedagogy of graphic design education, with no rules of practice. This was manifested within the study. From the findings, there were various contradictions that occurred inside the studio or classroom between students and their lecturer during graphic design projects, especially within the studio.

6.1.1 The lecture room/studio setting

Through the qualitative methods of observation of activities, documents, and sometimes through interviews, the study captured the situation in a practical lecture room/studio setting where students were given projects and were made to go through series of developing ideas for various projects and assignments. The observation of the various projects, both in the lecture room/studio and during informal studies by students, spanned a period of four months, from September to December 2012. One such assignment was branding of a 'dying' telecommunication network provider, '**Espresso**', and also producing an advertising poster to introduce a new package for '**Espresso**' customers. This lecture room also serves as a studio, since the department lacks infrastructure that will allow for a separate lecture room and studio. Moreover, there is no dedicated computer laboratory for the department, and students are encouraged to come to class with their own laptops. There are situations where students do not arrive with laptops, possibly because they do not own one. They might have desktops in their rooms (as

captured in Section 5.2.3). This seems to create an element of mistrust, as to the authenticity of students' work, as remarked by **Lecturer 1**:

Well the main difficulty is the fact that not all students get access to the computer [laptops]; as I said, some may parasite [sic], some may have to fall on friends or colleagues; and as I said earlier on with what I did with my students, about four students were sharing one laptop and this is a situation where the owner of the laptop is the one who keeps it, how do the other people get access to the use when they need it at certain times; in other words if they want to practise on it, how do they get access to it? So you see the idea is that the ideal thing is for everyone to get his or her own laptop.

An average class comprises 130 students. The class is therefore divided into two groups of about 65 students per group. This notwithstanding, the purported studio/lecture room can conveniently accommodate an average of 35 students but is now being use to accommodate 60 students (Figures 6.1 and 6.2). Attempts are being made to renovate and expand these lecture rooms/studios to accommodate large numbers in one session. One of such renovated studio was already completed for the second-year class at the time of this study, and can accommodate an average of 85 students comfortably—still not big enough for one whole class. Notwithstanding, students were seen busily concentrating on their individual works, with rapt brainstorming for ideas during class sessions. There were no responses that indicated that the classroom settings were actually affecting students' ideation performance.



Figure 6.1: Classroom/studio setting with students during ideation class

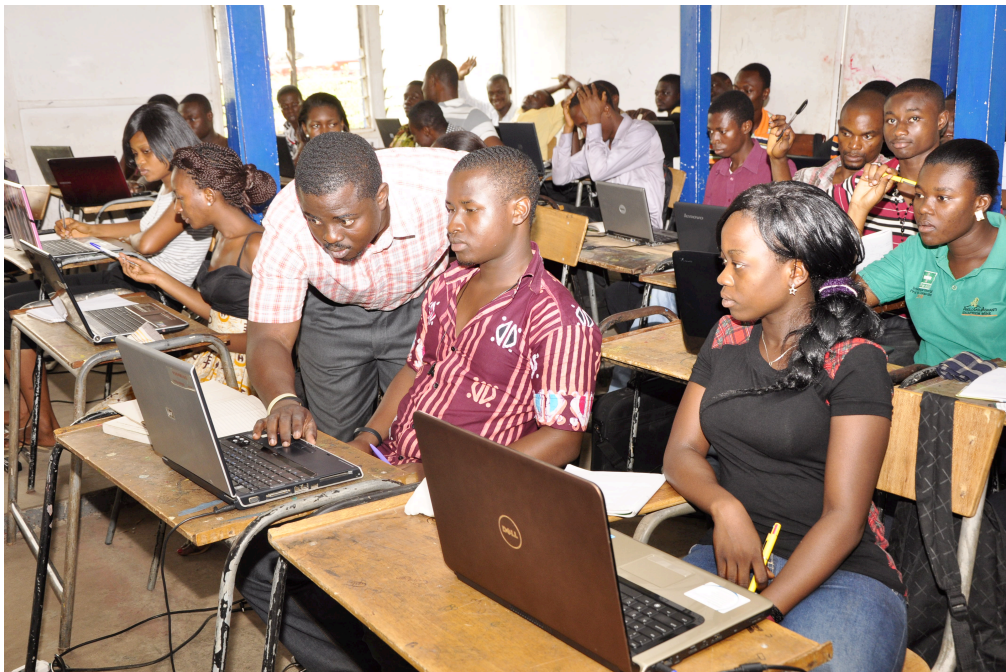


Figure 6.2: Lecturer moving around to assist students during ideation class

As part of the pedagogy, students were to develop their ideas for discussion, after which the ‘acceptable’ one would be chosen for final execution. The underlying principle was that students would develop their ideas using pencil and sketchbooks. The processes in which students engaged in their lecture room/studio environments

were observed. Within this case study, the focus was not the entire duration of the completed project, as the emphasis was on my unit of analysis—processes of developing ideas with tools—that dovetail to the final execution of the work. There was also a focus on the use of ICT tools (computer and design software, Wacom tablets, the Internet), compared with the traditional graphic design practice of idea development in sketchbooks that led to the final presentation of the design. Other observations were how the lecturer was relating to individual students concerning the initial processes of idea development, and also how students were relating to one another concerning peer feedback.

6.1.2 Implication of ICT on current pedagogy of ideation

The issue of ICT and its effect on the pedagogy of ideation in this discussion lends itself to one of the hypotheses that drives this research: that students will show some attitude of sidestepping and will distort the design process of ideation as long as educator/learner interaction in ICT and proper studio activity are not guaranteed (Figure 6.1). The framework of activity theory (AT) (Engeström, 1999b) was used to position the study and as basis for understanding context-based investigations of individual and group-mediated actions (Chapter 3.3). However, it focused more on an interpretivist framework as envisaged in the creative process of graphic design education with ICT.

From the framework (Chapter 3.3), issues of tensions, disturbances and experiences created by the everyday activities of the students and the lecturer as they interacted with ICT in their ideation processes were captured. This is a complex situation, since the teaching of the ideation process was conceived on a non-ICT platform, but is currently being grappled with during the use of ICT. Wang (2011) agrees that computers are now being used in design education as sketching tools from the very beginning of the design process. Design educators mostly resist such daring innovations, even though they do admit that ICT does increase the creative capabilities of students (Section 5.4.14). Wang (2011:191) contends that educators should take a second look at what ICT can do.

6.1.3 Influences of ICT on ideation process—activity theory perspective

One of the themes that emerged from the qualitative analysis was the influence of ICT in the activities of ideation. While it is important to support ideation with ICT, it is also important to understand that such support and integration can only be

successful when the right pedagogy is created. Absence of such a pedagogy created ‘disturbances’ and ‘tensions’ within the process of ideation, especially in the large class. **Figure 6.3** is used to illustrate the ICT influence that resulted in disturbances and tensions. It shows the varied distortions that seem to be happening within the current studios as captured by the observation within the case study. The red arrows are the distortions identified within the scope of Activity Theory.

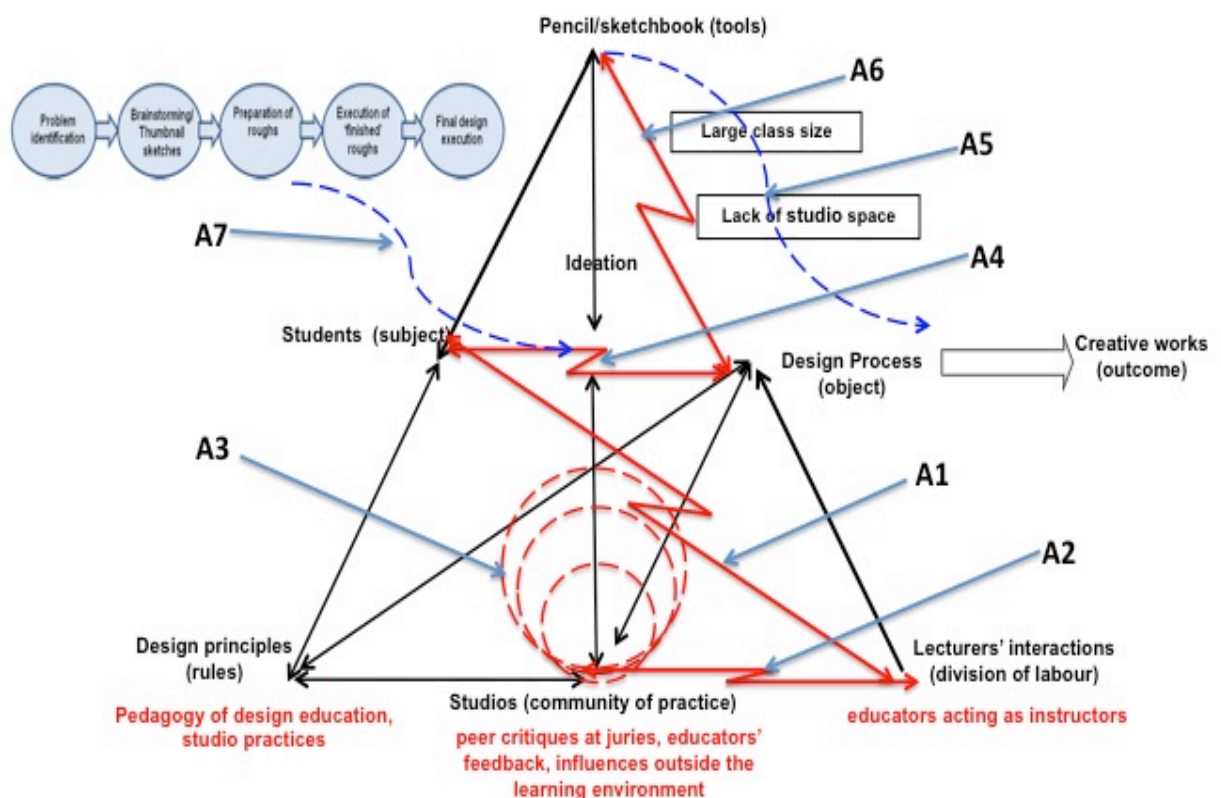


Figure 6.3: The disturbance of the ideation process as captured in the large class size and with ICT integration without the right pedagogy

While the briefs were discussed in the lecture rooms, students were seen scribbling thumbnail ideas in sketchbooks, with others also working on their laptops. It was interesting to observe how some students conceptualised ideas and tried to brainstorm with computer technology, to the oblivion of the lecturer. Students were supposed to do such initial brainstorming using pencils and pens in sketchbooks. Those who captured ideas in the sketchbooks later were seen converting them digitally on Wacom tablets.

Interviewing students later on, it was revealed that conceptualisation took place while the briefs of the assignments were given, and students therefore needed to capture them before the idea faded away. Through sketches and visualisation, as a form of brainstorming, concepts were developed. These concepts formed the ideation activity that led to their objective, and later resulted in the final outcome of the projects that were presented to juries. From a pedagogical point of view, and within this study, these steps were seen as more of a professional approach than the students' approach to the ideation process, since the sketches were not in sequential order (Resnick, 2003).

In the studio, students discussed their thumbnail sketches with their lecturer and colleagues, as a way of fine-tuning. Significantly, few of the students in the class were able to discuss their thumbnail sketches during the formal studio jury. The major reason for this was the large student population (127), against the limited time allocated for this course, although the assignment called for independent study. To facilitate this, students were asked to display their initial thumbnails digitally via an LCD projector for the lecturer's comments during later studio discussions. These digital thumbnails began the digital process of ideation, where students tried out various layouts and different fonts and types on the computer to see how they worked with the chosen concepts. From this point forward, the processes become exclusively computer-human interaction, with downloaded images—some taken from the Internet—alongside students' own photographs, taken at a nearby photography studio with friends as models. It is important to note that these processes took between two to five days to arrive at the chosen solution to the problem.

The selected ideas were then presented to the class as a final rough presentation of the concept for critique and jury in the studio. Students are required to make presentations and explain their outcomes for final approval and feedback upon completion of the idea generation phase. Except for a few cases, almost all presentations were accepted. At this stage the critique involved discussions on colour choice, layout and images that had been captured according to the brief requirements.

Observing the processes from thumbnails to the final design (both initial and digital),

and how students went through their ideation process, identified that ICT inclusion created pedagogical challenges in the pedagogy of graphic design. Even though ideation is 'the process of generating, developing, and testing ideas that may lead to solutions' (Brown, 2008:4), one engages with the mind more than with tools in the process of brainstorming, organising, sketching, thinking and imagining with a view to creating ideas for implementation. From observation, about 70% of technological tools were used to realise these objectives and outcomes during the ideation process by students. These included computer technology, Wacom tablets, scanners and software for sketches and drawings, and also for refining the images, which were mainly for the ideation process. Students used appropriate software to draw and fine-tune their sketches, leading to further conceptualisation for the brainstorming in the ideation process.

Most students had used pencils and sketchbooks for the initial capturing of briefs and conceptualisation, but along the line, switched to the use of ICT tools, and ended up finishing the work with ICT. The pedagogy of design education calls for greater interaction, since the lecturer acts as the 'client' and 'master', according to the Bauhaus principle. This principle informs the basis of graphic design pedagogy, especially in developing countries. However, this interaction was hardly seen at the development stages, and the only interaction students had with lecturers, was when the briefs were discussed in the studio/lecture rooms. This is in contrast with the Bauhaus principle, and thus creates a contradiction (**Figure 6.3: A1**) where there was supposed to be teacher interaction with students.

During studio interaction, especially with juries and students, no meaningful feedback was captured since the large class did not allow for proper interaction (**Figure 6.3: A2**). Students whose works were displayed on the projector had one or two instances of feedback from their peers, as the majority of their peers were far from the displayed works and were therefore seen concentrating on their own works in their sketchbooks. As Graham (2003:18) emphasises, 'criticism is the main pedagogical method used in the design studio. The studio revolves around teacher demonstrations, desk 'crits' given to individual students by peers and teacher, and juries of final design solutions. ...Critiques in the studio also help students develop their own critical faculties by instilling the process of reflecting and reacting to design intentions, which lead to their design decisions, and then reacting to the consequences of each action' (Graham, 2003:18). In this reported study, there were

not enough critiques and interactions that helped individual students in their design decisions. Moreover, there was no pedagogy to integrate ICT, which would have allowed such a jury to be conducted, and this resulted in serious contradictions (**Figure 6.3: A2**). It may be significant to note that students belong to study groups, and when they meet, some aspects of ‘critiquing’ go on among themselves (**Figure 6.3: A3**).

Even though some ideas were easily captured with pencil on paper, while others were captured digitally, a number of sketches did not reflect the pedagogy of design, as indicated by Hodge (2009). Moreover, the final design solutions also did not reflect in the smaller number of thumbnails seen from the sketches, even though the designs indicated ‘great’ ideas from the brief. Later, in an interview, one student indicated that ‘an idea can creep up at the final stages of all your thumbnails, and the more you come up with them the more new ideas you can come up with’.

Such activity could create problems with pedagogy since ideation requires a follow through of sketches to arrive at a design solution. Traditionally, the designer’s way of thought has to go through the design process to communicate effectively—problem identification, brainstorming/thumbnailed sketches, roughs, finished rough/comprehensive, and the final design—will have to be followed through according to the adopted rules (**Figure. 6.4**) (Appiah & Cronje, 2012).



Figure 6.4: The ‘traditional method’ of the design process (Appiah & Cronje 2012)

Another significant ‘disturbance’ occurs in the pedagogy of graphic design (**Figure 6.3: A6**), when students are ‘forced’ to go the traditional way of developing ideas without any clear pedagogy for ICT. As a result of large classes and a lack of studio space, students seem to circumvent the ideation process and arrive at their final outcome (**Figure 6.3: A5**), possibly due to the absence of student/lecturer interaction (**Figure 6.3: A1**). For academic purposes, students have to include their

thumbnail sketches when submitting their final work, and these should be hard copies. Careful observation of these sketches (**Figure 6.5**) reveals that these sketches did not really follow through the sequences and stages of the ideation process, creating contradictions of ideation in the activity (**Figure 6.3: A4**), even though the final designs clearly displayed great concepts and the creative abilities of the students (**Figure 6.6**). Such a situation also emphasised the argument that the emergence of digital studios has shifted the design process into the digital domain, allowing students to show their prowess in graphic design using ICT.



Figure. 6.5: Sample of thumbnail sketches by students captured digitally for fine-tuning

Even though Wang (2009:211) associates using ICT for design educational purposes with the persistent failure to find a link between theory and practice, and the difficulty of training teachers to use ICT creatively, the issue of the right pedagogy cannot be glossed over. ICT integration seems to be dominant in the ideation process in current graphic design education. Since students see ICT integration as support for the acquisition of new skills and enhancement of their ideation process, the tendency to lean on ICT should not be discounted. If educators are now encouraging constructivism, then ICT has the potential of offering that support. As Wang (2009) posits, 'If constructivism had not already existed, it seems likely that ICTs would have invented it to explain how they operate' (Wang, 2009:208).



Figure. 6.6: Sample of the refined works with computer technology

6.1.4 Implication of ICT as tools for collaboration in the studio pedagogy

In looking at how the introduction of ICT affects the teaching and learning of ideation practices, one critical question that needed to be addressed was: **What happens when students develop ideas with ICT in the current studio?** The idea that learning involves a deepening process of participation in a community is the focus at the studios. The aspect of learning in the model of Activity Theory posits that learning involves a process of engagement in a 'community of practice'. Communities of practice are groups of people who share a common concern or a passion for something they do and learn how to do it better as they interact regularly. According to Wenger (2006), not everything called a community is a community of practice. Rather it becomes a community of practice when there is a domain of interest; relationships that enable people to learn from one another, help one another, and share information; and finally those who share in the practice (Wenger, 2006).

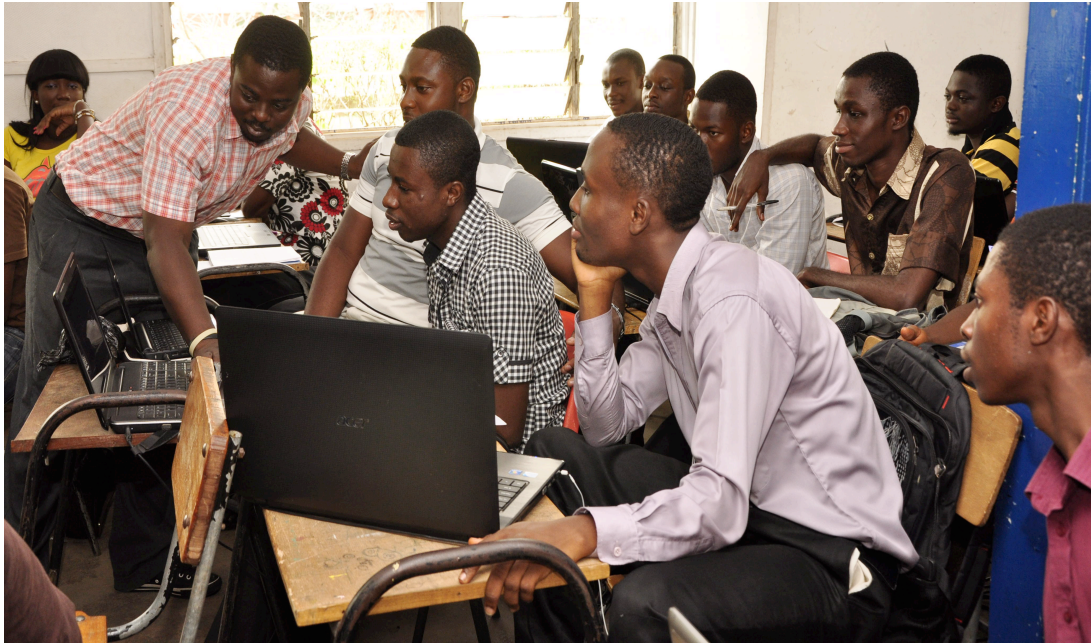


Figure 6.7: Lecturer giving desk critique on students' work as captured during the study

Within this case study, and by observation, together with readings from the literature, the studio was captured as the community of practice where students and lecturers meet to learn from one another. Through observation, it was noticed that students were required to bring their initial thumbnails of pencil sketches and the digital sketches, to be discussed and critiqued by both lecturer and students at the studio. As Graham (2003) emphasises, 'Criticism is the main pedagogical method used in the design studio.' Here, the studio revolves around teacher demonstrations, desk critiques given to individual students by peers and teacher, and juries of final design solutions. 'Critiques in the studio also help students develop their own critical faculties by instilling the process of reflecting and reacting to design intentions, which lead to their design decisions, and then reacting to the consequences of each action' (Graham, 2003:18). As a result of the size of the class and the settings, no meaningful studio interaction or feedback for students from lecturers took place during the juries. This also created the contradiction as seen in **Figure 6.3: A2**. From observation, students had less feedback from peers within the studio, since the majority of the students were seen concentrating on their own work in their sketchbooks and on their laptops. When there is an open critique of students' work, it has a positive impact on other students. Apart from lecturers moving to individual laptops, there were not enough peer critiques or interaction that helped individual students in their design decisions. Such activity created some distortions and

disturbances as per the Bauhaus pedagogy, and as posited by the community of practice.

6.1.5 Ideation process with rules and the object

A major focus of the study area was **what happens when students begin to go through ideation with ICT, in their design process**. The study revealed that when students' final designs were viewed against the approved thumbnails that were digitised for refining, 'dramatic changes' had occurred. Between the digitisation and the final stages of the ideation process, major changes in types/fonts and layouts, and even in the choice of image and in manipulations, had occurred. Judging by the questions asked, lecturers seemed not to have 'trusted' some students' capacity to execute their work, since the final designs showed some serious gaps in the flow of the development of the thumbnail sketches. From an ideation viewpoint, the changes gave the impression of a vigorous iterative ideation process, but there was no indication that those ideation processes were captured by the pedagogy. As one student remarked during a follow-up interview,

'It is possible for an idea to 'drop' at a later stage of my idea development process' [Hube].

This might be the probable cause of the lecturer's lack of confidence in the students and the fact that there was no clear pedagogy that sought to interrogate and integrate ICT and ideation.

Bender (2005) identifies four conditions for effective studio work in the design process as it relates to design education. These conditions are also corroborated by Schon—*The Traditional Studio Today*, and Kvan—*Kvan's Theories on Effective Online Studios* (in Broadfoot & Bennett, 1991). These conditions are *learning by doing, one-to-one dialogue, collaboration and process-focus*, and these undoubtedly are critical pillars in the pedagogy of design education.

The introduction of ICT in this situation had shifted the design process into the digital domain. In the condition of *process-focus*, Bender (2005) remarks that less emphasis is placed on the final evaluation of the outcome of the design concept as students are taken through critical design processes that lead to a knowledge base, not only on ideological considerations (Dutton, 1987), but also through exploring imagination, documenting ideas and seeing how they are properly built (Dale, 2006).

The process-focus also forms the basic ideation process in the evolution of creative

design and must be the focus of any design pedagogy.

The exploration of imagination and documentation of ideas which do exist 'in the head' (Vygotsky, 1982 in Kaptelinin & Nardi, 2006), seems to be possible, especially with ICT as tools of mediation as conceptualised by activity theory in the diagram—by the horizontal movement from subject to object. Such movement is referred to as 'internalization' or 'transition of an external operation into an internal one' (Vygotsky, 1983 in Kaptelinin & Nardi, 2006). According to Kaptelinin and Nardi (2006:43):

In the process of internalization, some of the previously external processes can take place in the internal plane "in the head." It is not just an elimination of external processes but ... rather a redistribution of internal and external components within a function as a whole. The raison d'être for internal activities is their actual or potential impact on how the individual interacts with the world and the impact can be made only through external activities.

6.1.6 Educators' regulation of ideation in graphic design with ICT

The introduction of ICT and computer technology has caused these tensions and contradictions because of a lack of appropriate pedagogy for graphic design education. Many design educators are grappling with ICT and the influences which digital representation is having on the ideation phase of graphic design. **How do educators regulate the issue of ideation in graphic design with ICT?** Although the class was large in terms of numbers, there is a possibility of educators' engaging in the adoption of Innovation Education (IE) as a way of dealing with these issues. Thorsteinsson et al. (2010), contribute to the notion of ICT in idea development, positing that ICT with ideation is possible digitally, through Virtual Reality Learning Environment (VRLE) technology. My observations in the reported study reveal that IE was not part of the discourse of the project. With IE, there is the possibility that one could use the VRLE tool for ideation in many courses, including for open- and distance-education students (Thorsteinsson et al., 2010:314), who could engage with lecturers online, using virtual design studios. In discussion, lecturers could comment on their designs via email and other social networks for feedback, thereby encompassing a clear pedagogy of ICT. Such a situation may require that both student and lecturer have a clear understanding of the problems, and a sufficiently specialised vocabulary with which to exchange ideas. In the virtual studio, since everyone will have the opportunity to view the sketches on display through online

projections, others could make their contributions known, and feedback from other colleagues (members of the community of practice) could help shape ideas. These will then reduce the tensions and contradictions shown as in **Figure 6.8** by the red dotted lines (**B1**, **B2**, **B3** and **B5**).

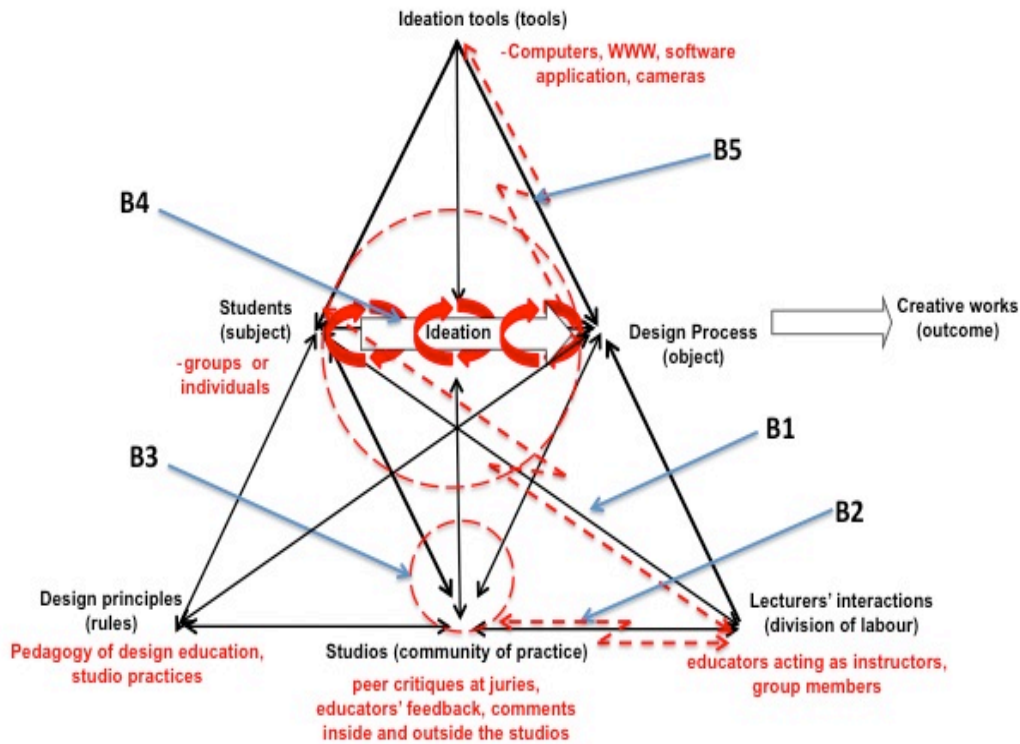


Figure 6.8: The process of ideation with ICT integration and correct pedagogy

6.2 Analysis of open-ended questions

6.2.1 Students' views on ICT for ideation activities

Discussions within this section centre on **Section 3** of the questionnaire, where students were asked to respond to some open-ended questions (Appendix A). Respondents were asked to give their direct and frank views on brainstorming and sketching with designs; what difficulties they faced using ICT for ideation, and also to offer some suggestions for improvement in ideation with ICT. About a third of the total respondents did not complete this section of the questionnaire. It seemed the respondents were either tired after going through the previous sections or were reluctant to write anything. Whatever their reasons, they were indications of respondents' views, as were captured in the completed ones, which also reflected the views expressed in **Sections 1** and **2** of the questionnaire, as well as in the

interviews conducted. Findings from this section are reported under various themes and under sub-sections.

6.2.2 Open views of the ideation process with ICT

Students expressed divergent views in this section. The majority of students indicated ICT as being helpful for their idea development. Some of the comments indicating ICT as helpful include:

- 'I think it is great and should be encouraged.'
- 'Quite helpful and okay.'
- 'I think it is a good step towards communicating and learning how to design effectively.'
- 'Brainstorming and sketching using ICTs are very easy than without them.'
- 'Brainstorming and sketching using ICTs helps me to get very extraordinary ideas because of the other works I see on the Internet. And this really helps me a lot to easily get ideas for my work and understand it better.'
- 'It helps me to create more ideas and good designs.'
- 'It is fast and easy.'
- 'It is the best way to achieve desired results.'
- 'It can help improve our design concepts.'
- 'I think it's good exploring, as ICT gives a wide range of ideas to brainstorm and sketching [sic] and helps to execute your processed work to the final product.'

However, there were others' comments that indicated some challenges for ideation with ICT in developing countries. Some of the comments students gave in such circumstances were as follows:

- 'It is difficult for me and I think it should be inculcated at [an] early stage.'
- 'It is good but in some way, I think using foreign works as inspiration for brainstorming and sketching would cause us to lose our African touch.'
- 'I'm used to making thumbnails in pencil and would prefer using ICT but I'm handicapped on that.'
- 'It's good but whoever starts brainstorming in design process using ICTs should be good first with their hands.'

These samples were picked randomly from the numerous questionnaires received. It was difficult to establish challenges, since the majority of responses noted the

positive aspects of using ICT for ideation. Nevertheless, all responses prove that students have a positive view of the use of ICT for ideation, and that they are already using ICT tools for their ideation processes. Yet, there are others who are either not using ICT for ideation, or still think ICT is not to be used encouraged. Some other students wrote:

- 'I have never used it and will not want to use it.'
- 'You will need the skill and software knowledge to be able to brainstorm and sketch using ICT.'

6.2.3 Difficulties in brainstorming and sketching with ICT

A listed number of difficulties indicated by students were captured and placed under themes established during the literature survey and review. Not all the questionnaires were used in the capture of these lists of difficulties indicated by students. Of the 238 questionnaires, 96 were picked randomly for this exercise. Based upon the number of respondents, 96 is a credible sample for this exercise (Sekaran, 2003:295).

After an initial listing of the difficulties, these were classified under eight themes. These eight themes were later merged into three major themes, namely, (1) issues of collaboration, (2) pedagogical problems, and (3) tools and software applications (**Table 6.1**). The initial items collated and plotted on the graph¹ indicate pedagogical problems as the highest-ranking item, followed by tools and software, and then collaboration issues (**Figure 6.9**).

Table 6.1: Themes from students' responses on ICT for various ideation processes

Issues of collaboration	1. Lack of collaboration from lecturer 2. Discouragement from our lecturers 3. Contacts with other students and lecturers
Pedagogical problems	1. Mixture of ICT and traditional methods 2. Distinguishing between inspiration and copying 3. Hand drawings and image manipulations
Tools and software	1. Limited access to computers and software 2. Bad Internet connection and slow bandwidth

¹ The graph indicates a multi-method approach to plotting qualitative results along the lines of a quantitative idea.

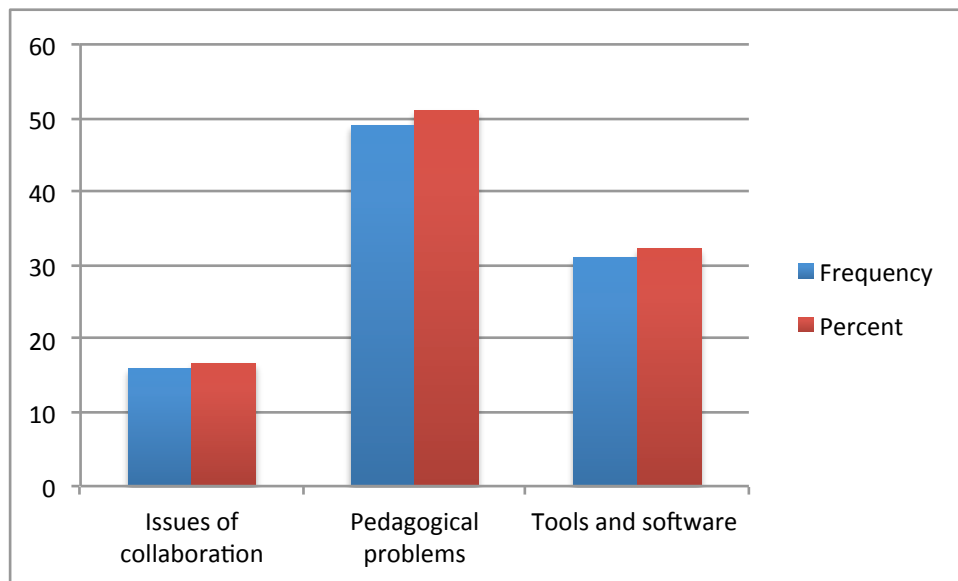


Figure 6.9: Students' responses on ICT for various ideation processes

6.2.3.1 Pedagogical problems

Problems about pedagogical issues seem to have dominated the difficulties student listed. Some of the items listed include: getting ideas before using the computer at some stages; difficulty in using the right tools for the right approach; you might unintentionally be copying someone's work; too much information but not necessarily relating to my ideation solutions; no direction in our tuition in this area. These pedagogical issues are what educators need to overcome if ICT can be integrated usefully in ideation.

6.2.3.2 Tools and software

Issues about tools and software were captured as the second-most dominant items indicated by students. Problems mentioned here included:

- 'We need graphic tablets for easy sketching.'
- 'One needs other devices to do it right.'
- 'Accessibility of resources is difficult.'
- 'Power fluctuations make using ICTs difficult.'
- 'The department should acquire the latest graphic design software.'

6.2.3.3 Issues of collaboration

Issues of collaboration were further bones of contention. But for lecturers' lack of enthusiasm, students believe that ICT could be a basis for collaboration. Some of

the statements include:

- Difficulty in using ICT since lecturers do not seem enthusiastic about the use of ICT, especially with ideation.
- Discouragement from lecturers.
- Lack of collaboration and sometimes difficulty in working with peers, since they might not be available when they ought to be for online discussions on assignments. This is as a result of poor Internet connectivity.

These issues are further discussed in subsequent sections.

6.3 Analysis of the interviews

According to Descombe (2007), interviews seem to an attractive proposition for researchers. Even though they might seem simple—since they do not seem to involve much technical paraphernalia—the reality is that it is not quite so simple. One major advantage of the interview is its adaptability. A skilful interviewer can follow up ideas, probe responses, and investigate motives and feelings, which the questionnaire can never do (Bell, 2005). As Descombe (2007:175) contends:

*When the researcher needs to gain insights into things like people's opinions, feelings, emotions and experiences, then interviews will almost certainly provide a more suitable method – a method that is attuned to the intricacy of the subject matter. To be specific, interviews – in particular in-depth interviews – lend themselves to the collection of data based on: **opinions, feelings, emotions and experiences**. The nature of these means that they need to be explored in depth and in detail rather than simply reported in a word or two.*

The interview, as stated in **Section 4.4.2**, was one of the effective ways of obtaining the opinions, experiences and feelings of the students and lecturers on the ways in which they see, use and understand ICT. It divulged the emotions of both lecturers and students on the use of ICT in ideation activities. Conducting interviews with students and lecturers revealed the perceptions of both students and lecturers on the use of ICT, which would have been difficult to grasp with only observation, especially in the studio/lecture room. Moreover, in respect of ICT and ideation, there exist a plethora of perceptions.

According to Wang (2011), computers are now used in design education as

sketching tools from the very beginning of the design process. This represents a daring innovation that many design educators still resist. In the interviews with lecturers and students, I was able to gather various opinions that had also been reflected in the literature. Questions for the interviews included background, knowledge, experience or behaviour, opinions and feelings (Fraenkel & Wallen, 2003:512). Since I was the only person conducting the interviews, experience with earlier participants allowed me to vary my questions with later participants—both students and lecturers—in order to ascertain some intriguing issues in ideation with ICT. Moreover, some of the activities that I observed in the studio and with students were used as points of departure in order to seek clarification, and also to triangulate other data collection instruments.

While it is important to support ideation with ICT, it is also important to understand that such support and integration can only be successful when the right pedagogy is created. This section discusses the various thematic results that emerged from the coding processes of the interview, revealing the effects of ICT on the pedagogy of ideation, especially in developing countries.

With the aid of Qualitative Content Analyser (QCA) software, the data was defragmented into codes and categories. The qualitative description of the interviews generated as many as 316 initial codes of the ICT, ideation and related influences in the activities of ideation and pedagogy from responses of interviews with 10 students and 9 lecturers (shown in Figure 6.10). These were scaled down to 89, which resulted in six themes emerging. The themes represent the complex events, behaviours and real-life situations lending *themselves to the collection of data based on: **opinions, feelings, emotions and experiences*** (Denscombe 2007:175) during the case study and which were pivotal for the main research questions: ***What happens to the teaching and learning of ideation in graphic design when students begin to use ICT in direct contrast to traditional graphic design pedagogy? How do the ICT methods affect the pedagogy of graphic design in a developing economy?*** These themes as emerged, were done with Activity Theory as a lens in the study and also with the reviewed literature. They gave credence to the concept of ‘multi-strategy research’, ‘integrated methods’, ‘multi-method research’ and ‘combined methods’ research (Denscombe, 2007:107).

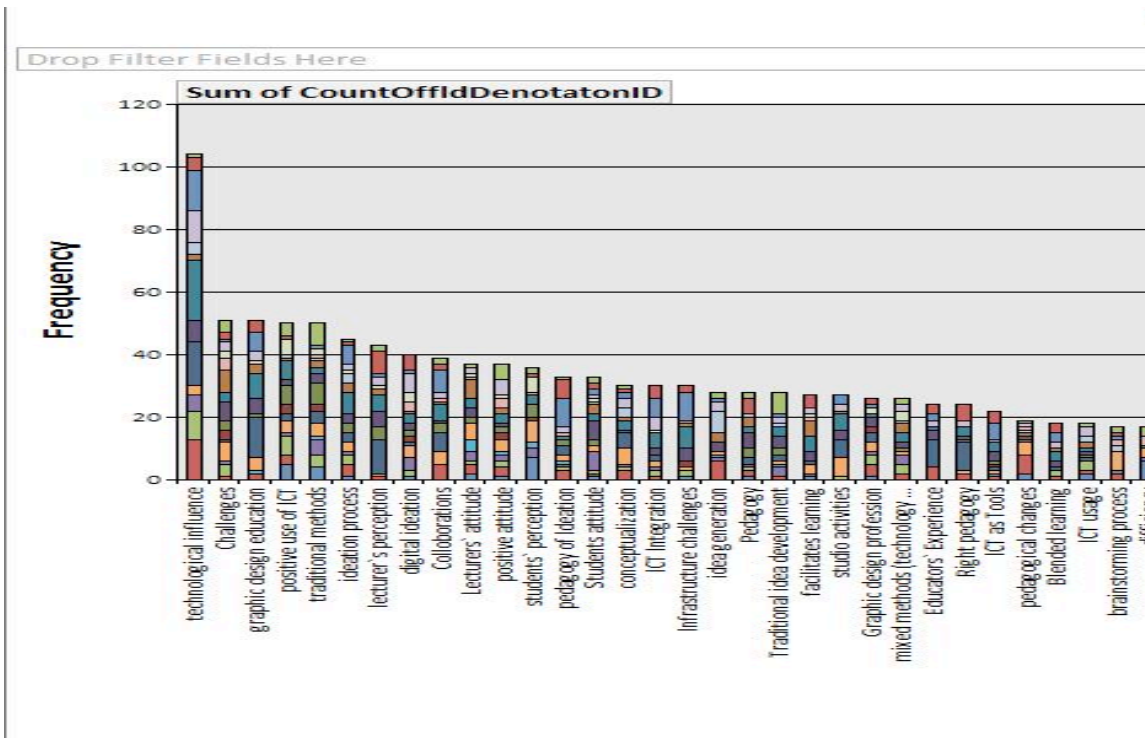


Figure 6.10: Significant categories from lecturers and students' responses

Using the combined-method approach, and based on the framework of the study (Chapter 3.3), themes of complexity, ideation activities, pedagogical challenges, technology adoption, constraints, and contradictions, as well as mistrust and misconceptions (as shown in **Figure 6.11**) were captured. These are discussed in subsequent sections. During the analysis and categorisation, some statements made were found to contain various codes and meanings that were linked, and therefore these were placed within more than one theme, based upon the statements.

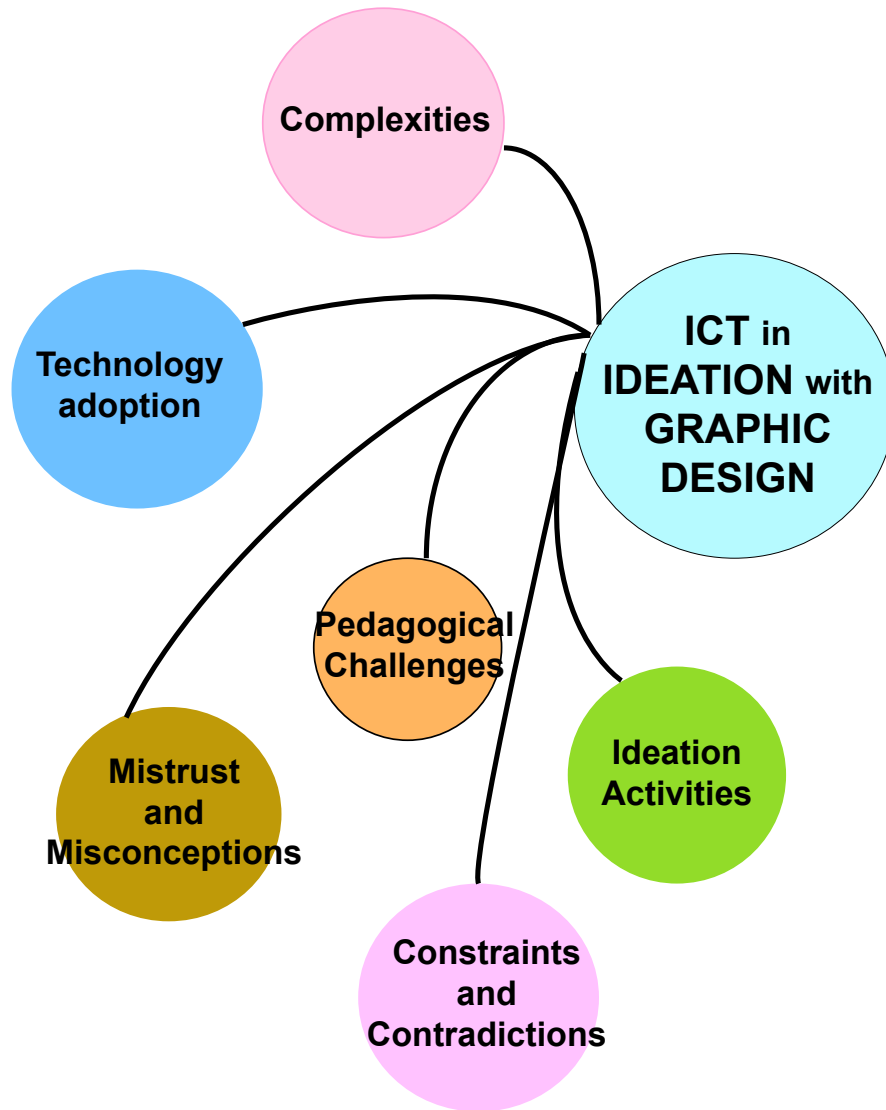


Figure 6.11: Graphical representation of themes from the all categories

6.4 Influence of ICT in ideation: Technology adoption

The data revealed significant evidence that tends to suggest educators and students' willingness to adopt technology. When the theme of technology adoption was plotted on a graph, the codes of technological influence were the highest number of codes that were recorded among the major and highly significant categories. The codes of transcription of the interviews of only lecturers were plotted on a graph, which indicated technological influence as the highly significant category. Conversely, when the categories of only students were plotted, technological influences did not appear in the highly significant categories even though it was part of the significant categories. Perhaps the following statement from

Lecturer 8, who has been teaching graphic design for 31 years, might sum up lecturers' acknowledgement of technological influence:

*'I think you know these days, even my granddaughter, who is 4 years old can talk to my 1-year-old son on his toy cell phone; and they can tweet and do other things; it will surely work. We now have Facebook, tweeters and all that kind of stuff and these could be some extensions; now what we are doing ... with tablets and social media and also again we can have different learning management systems (LMS) and things like that which should make it possible to work, one way or the other. **But I just want to say that the technology must be harnessed and used in a very careful and orchestrated plan manner.** You also have people who are technologically far advanced, astute and competent but then again not mere graphic designers and who will come out with something which I call 'a dog's breakfast'; its like a football player, you can be very fit but not have the ball skills and then you will not be anything good in the team, but you have the ball skills and the same fit for football then you can always make you fit and will become part of the team; so the ball-skill player is in fact your designer, with that technology skill [...] fitness for [...] the programme.'*

'Careful and orchestrated plan manner' will demand another line of enquiry by researchers.

Lecturer 7, who has been teaching graphic design in the department for seven years, believes technology adoption is the way to go with ideation. He shared his views with the following remarks:

'In fact, I see that ICT helps a lot when it comes to idea development because traditionally, as is alluded to, one will have to face the class and discuss concepts, and ideas right from scratch and go through to the comprehensive; but with the use of ICT, you will realize that you can buy into other minds and other ideas and discussions that might have gone on about ideation and get your students involved in the discussions, and develop the nitty-gritty ways by which they can quickly find ways of solving problems in idea development. If you will recall the works of Mary Stewards in the book: 'Launching the imagination', you will see that the online version helps student to get more information as to how engage in

ideation as in graphic design students.'

At the extreme end of the theme of technological influence is the issue of skills. This category appeared as one of the least significant categories in the combined graph of lecturers and students, lecturer-only graph and even student-only graph. Indeed, on the graph of students' categories, the issue of skills was the least item. Even though the study did not investigate the influence of ICT on ideation skills, there was no indication of ICT's affecting skills of final outcomes of students' work. On the other hand, there were indications from lecturers that students will need to acquire the basic skills of conceptualisation as part of the ideation process, as this will inform them of the appropriate tools to adopt. In instances where ICT is meant to support ideation skills, lecturers will first have to direct students using fundamental skills, and ICT will actually improve the process of conceptualisation, especially with innovation education (Thorsteinsson et al., 2010:316).

6.4.1 Technological influence

As stated in the previous section, within the combination of interviews from both students and lecturers concerning technology adoption, 'technological influence' was the main category that emerged. These technological influences were both negative and positive, depending on when and what the situation might offer. While educators accept that technology influence is unavoidable, they are concerned about the negative effects and misuse of technology. In the study, there were many instances where technological influences were seen to be distorting the pedagogy of graphic design education. As **Lecturer 1**, who has been teaching graphic design for 32 years, complained:

'Yes ... the possibility [of ICT usage] is there but as to whether they [students] can use it is my problem. Even now that we have direct contact with students, you know ... it is not all of them who will work from thumbnail sketches till the end. Now somebody may just work on the first idea that comes into mind; okay; then again he knows, oh ... I can get the computer to work on the ideas for me, or to fine tune it for me, you see ... and as I said, but from my historical background, you know.... I think the students need to do more; he [sic] needs to explore; they need to be more innovative and more creative.'

'Well, my view ... eh ... taking it from my background [...] and the way we

*did things at that time, you know, it (the traditional method of ideation) gives us opportunity to actually explore our creative abilities; [...] it gives the opportunity to also experiment; okay! [...] So you know, during our time, for example [...], again as indicated earlier; in idea development, **we were forced** to ... in idea development, we **were forced to**, maybe work on about 40, 30 to 40 thumbnail sketches, you know; all different ideas, putting them together here and there.'*

Even though he accepts technology as something to be used in the ideation process of design, he paints a picture of negativity and mistrust when students get involved. This is informed by his background training and therefore he will not try to compromise in anyway.

He also shares his sentiments on the issue of the lack of resources in developing countries, when asked if ICT usage is the way to go:

'O yes, I feel that is the right thing now [concerning the use of ICT]. But you know in terms of the numbers [of the class size], I wouldn't mind the use of ICT solely. But you see our thinking may not be the same as the people in the developed countries who may have been introduced to ICT right from the primary school; here, even in the university it is not everybody who owns the laptop and students might have to parasite on somebody's and before he gets his own he might have finished school.'

Not all the lecturers are sceptical about ICT and technology's influence. Others believe it is time that graphic design educators gear themselves for its use and application. Some have high expectations of technology:

'I will say we do have some expectations. This is because graphic design is seeing a lot of exploitation in terms of research, expansion of the knowledge, barriers, and goalposts and so on; and we feel that in order not to be side-lined or in order not to be victims of change, we have to buy into the global expansion of idea development, graphics and so on, ... making sure that we provide the requisite infrastructure in terms of ICT, to be able to be part of the change or part of the global conversations of ideas and so on that are going around....' [Lecturer 7]

The influence of technology permeated many areas of the activities of lecturers as they commented and remarked on many instances where they believed ICT, and for that matter, technology, dominated the pedagogy of graphic design with ideation. For some it is a tool that needs to be encouraged:

'[...] I never looked at ICT with the use of computer and,... or the software as anything other than a tool like any other resource one has; [...], you know whichever technology one uses, for me concept is the key; the idea generation or re-thinking of the ideas. So whether you use whatever means you use, the result speaks for itself; and [...] if you can successfully complete something on time, and at [an] acceptable and appropriate standard, then it shouldn't matter whatever you use. So for me the best tool for the job is what I will always recommend, be it ICT.'

[Lecturer 9]

'Personally, I feel it facilitates the work and makes it a little bit easier. Because using the ICT, especially in my area, the kind of work that we do, you virtually have to use ICT. You can't do anything without it; [...] you may find yourself using the ICT and I think to some extent, especially with the Internet; myself and the students as well, we are able to go the net; probably find ideas and compare to,... develop our scripts for production... so I do think ICT really plays a vital role in my teaching.'

[Lecturer 5]

For graphic design students, technology influence is of greater importance, both to them and their careers. Asked if such influences are not going to affect them negatively as envisaged by lecturers, **Belle**² remarked:

'OK; I think that is an excellent question; [...] I, I love blogs; I love blogging and I have my own blog; and I love; some kind of taking part in blogging things, commenting on other people's posts and blogs, I love design blogs' typography and photography blogs; that kind of thing; [...] I think there is definitely a fine line between copying someone's work straight out and [...] using their work as an influence; [...], I think there are very few things today that are original, and I think if you can take a

² Names of students as indicated in the study are pseudo names

creative licence, and use things that could inspire you, I don't think that is a problem at all; [...] Yeah, I think it's silly to think that way! Yeah, silly for the lecturers to think that way; that students might be stealing works or something like that, because as a designer I think there is nothing better than having your work up there and seeing it as yours but it might have been influenced and inspired by something or someone but that is your work and nobody could have done something like that.' **[Belle]**

For some of the students, ICT is seen as convenient for ideation, as reflected in the following statements during some interactions:

'After the composition, I had to go online and get one [image] that suits the composition, it was difficult to come by [with], less time for submission. I normally use search AOL and click on image, instead of Web, you type in all the words like lying, relaxing, stretching that have something to do with your composition...' **[Hube]**

'Well, I think I will go for the ICT; well because that gives me accuracy; I think [...] it helps in working faster; especially when you are familiar with the software, it is exciting.' **[Jimmy]**

'[...] Now there are a lot of improvement in design as to what students can do with ICT. I can see most of my mates are good at most of the software that can help them develop their concepts; well, they were not even taught here but could learn on their own; and they are coming up with great ideas and concepts; and I think these are challenges for us all to go deeper into the use of ICT for our idea development.' **[Ike]**

6.4.2 Positive use of ICT

Acceptance of technology is mostly seen as a positive tool for idea development and both students and lecturers are already involved in ICT. When asked if students were more interested in ICT in idea development than in the traditional methods of ideation, **Lecturer 4** responded with the following statement, which paints a picture of the positive use of ICT:

'Currently [being used] because it [ICT] frees them from working, so to say, working with the blank slate; normally there is that intimidation

*when you start something and you don't know where to go; even though you've done all the mind-mapping and everything and you really don't know how to start, **you can initiate something by doing some ICT search of some kind or some sort on the Net, it frees your mind, shows you other possibilities; so I think it aids ideation when managed well.** I'm more for the management, especially when it comes to idea development.'*

In a response to a question on how ICT is impacting on ideation, **Lecturer 5** again remarked:

*'Personally, I feel **it facilitates the work and makes it a little bit easier.** Because using the ICT, especially in my area, the kind of work that we do, you virtually have to use ICT. You can't do anything without it; you may find yourself using the ICT and I think to some extent, especially with the Internet; myself and the students as well, we are able to go the Net, probably find ideas and compare to develop our scripts for production ... so I do think ICT really plays a vital role in ideation, especially with my teaching.'*

Not only do lecturers recognise the positive impact of ICT; indeed, most of the students see the use of ICT in ideation as something remarkable in their work. Two students gave their impressions with the remarks:

Well, [...] I think ... it's (ICT) a useful tool; and if we are freely allowed to use it; [...] the more you use then you will understand; and I think the world. [...] [pause] .. the ... the world is changing and the, ... and the paradigm is being shifted to ICT ... everything is done using the computer, ICT and stuff so I love to go that line.' **[Ben]**

'I think it's so important; [...] specifically for us to keep up with the rest of the world; [...] It's eh the computers and technologies are prevalent in every set up and I think it is, it is useful for us to have them around and not to keep doing things with the pen and paper.' **[Serwaa]**

Another student makes a remarkable statement on the positive use of ICT:

'Oh, it has made me more confident to face the world as a professional

designer ... well, [and in future] I will want to see more in the ICT generated stuff being explored; because it is ... is; it is what is going on now; I think throughout the world they are all adapting to ICT to generate ideas so it could be useful if we developed along that line.' [Jimmy]



Figure 6.12: Student using Wacom tablet for sketching ideas for a project



Figure 6.13: Close up of the student using Wacom tablet for ideation

Meggs and Purvis (2012) agree that ICT and computer technology have revolutionised the graphic design profession. Since ICT and the computer is augmenting the pace at which graphic design problems can be solved, and permits designers to work more resourcefully, it is imperative that educators begin to train students with the right skills to perform in such a technological market. This study agrees with Meggs and Purvis (2012), that the profession now requires designers who can apply the right methodologies (with technology) to solve current design problems.

6.4.3 Digital ideation

Technological influence was also depicted in the use of ICT for digital ideation. From the analysis of students and lecturers' responses in the interview, it emerged that ICT for digital ideation was already being practised. **Lecturer 8**, who has been teaching graphic design for 31 years, has this to say:

*'Well from my own point of view some of the students say they are comfortable using the stylus or even rendering with the mouse like working on the PC and others are also comfortable with drawing but they eventual scan and work on it further; **but then if you draw and scan you still use the computer mouse to do the drawing using the digital tool** so [...], there seem to be people who will strictly want to work with that medium; some use the two but no matter what you do, **you still have to use digital especially the end product will have to go through the digital**; so you can just start from the manual and as [you] go along you introduce the digital.'*

Lecturer 3 was also emphatic about ICT for digital ideation:

*'I believe and I also do believe that we can have practical demonstrations and **also see digital representations as well because there are digital software**; software which help us to digitally create ideas from scratch in order to solve challenges; and so yeah, I believe that. **We can always have a very good combination of both practical studio practices and online.**'*

'Well, I do see the possibility and already I see them working with ICT;

... sometimes instead of them using their sketchpads, **they use the stylus and tablets to do their illustrations onto the PCs; ... and I think that has really facilitated their work.** But besides that, it depends on the effect you want to achieve in your work, because rendering work by hand also gives you some effect; so you may sometimes combine the two – rendering it with your hand and also use the stylus or tablet. **But in the end you will work on the ones you’ve rendered with your hands using the stylus on the computer.** So it is just like you are tracing over it.’ [Lecturer 8]

Stones and Cassidy (2007:60) acknowledge sketching as an important tool for ideation, since it lightens the load on memory constraints and also supports early design thinking through its ambiguity and fluidity.

6.5 Influence of ICT in ideation: Complexities

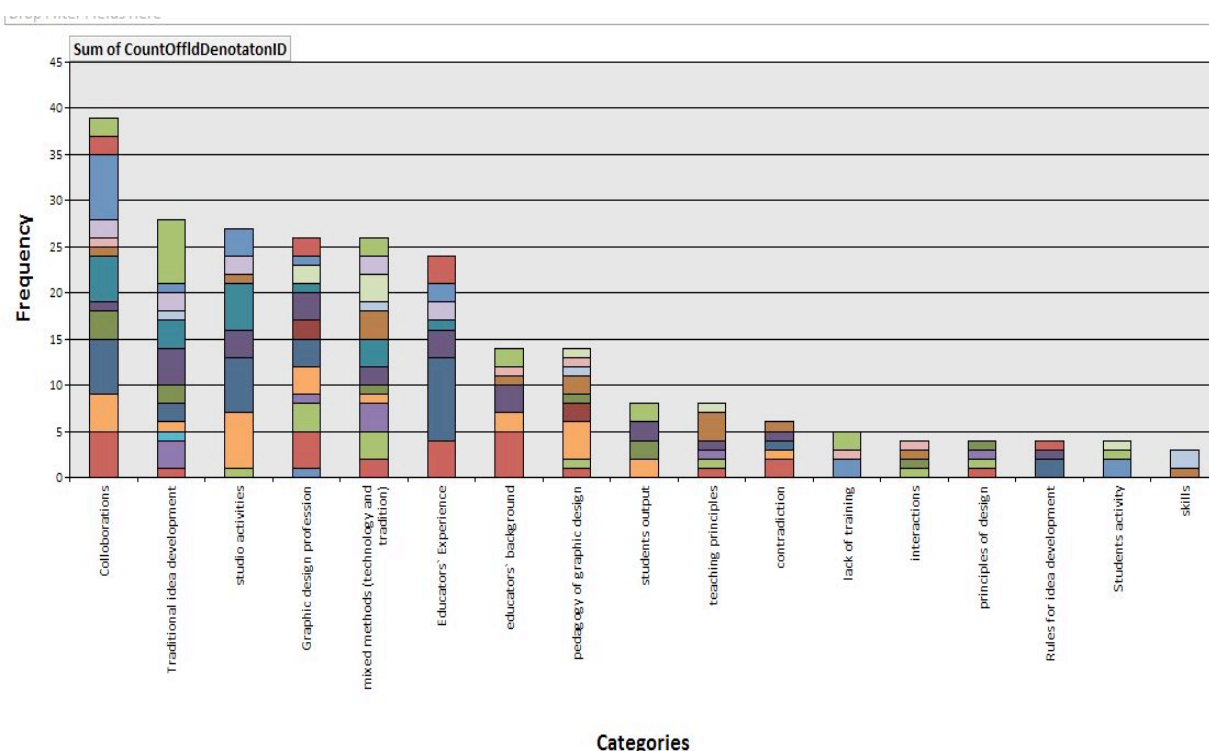


Figure 6.14: Categories from the theme of Complexities

The theme of complexities (Figure 6:14) depicts reflections of how ICT is viewed by educators and students in respect of ideation in graphic design. Literature shows that complexity theory in design education is the result of a paradigm shift in the

discipline that seeks to replace the current, dominant positivist paradigm with a more current paradigm based. This is as a result of the increased implementation of human–computer interactions (HCI) for designing in radically new ways within design education (Wang, 2010). The introduction of ICT in design pedagogy is changing the terrain of ideation, where students seem to ‘insist and expect’, while educators seem to exhibit a ‘not appropriate’ attitude towards ICT use. However, ICT encourages the collaboration that students expect from educators and peers, while educators also accept collaboration as a pedagogical part of ICT inclusion in design pedagogy. According to Brown (2008), some of the complexities that involve the process of idea development in solving design problems arise because design is not just coming out with a product, but also with ideas, services and systems, therefore focusing more on the processes rather than on the product. These complexities were manifested in issues about collaboration and traditional idea development.

6.5.1 Collaboration

Within the theme of complexity, collaboration was the main idea that emerged from the interviewees. Asked if students are more interested in ICT for idea development than the face-to-face contact, that is, sitting down with you, **Lecturer 5** indicated:

*‘Well I will say with that; I think the ICT, Internet teaching or the online, ... students sometimes contact you and say okay, if you can be on Skype we can book an appointment and then I will oblige and be on Skype and then **we can talk, discuss and they can ask me all the questions they want; and so that kind of informal teaching comes in.**’*

From the remarks of this respondent, through ICT, students can contact their lecturers and collaborate in the idea development processes; something denied students as a result of large class sizes.

When asked how, as an educator in graphic design, he would like to see ICT used in teaching idea development, **Lecturer 6**, who has been teaching graphic design for 30 years, painted a picture of complexity in collaboration with the use of ICT with this response:

‘What I realised ... is like most of them, when they bring their work; that

is their thumbnails, then I asked them to develop them to the rough stage; they bring the work on the computer; they don't want to print. They bring the work on the laptop and then we discuss on the computer. Then we do the corrections on the laptop; instantly the student will notice the differences; in the colour choice, in the font choice, in the layout; so within about 5 minutes, you can do all the corrections and then the student will start beaming with smiles, because its like some of them do not even have the basis of design; so when you keep on doing that with a student, then after a while they themselves will realise ... you can do these things within a short period within some clicks of the button; but for the students I don't know why they don't want to go through the fonts and select one that will be appropriate to the design that they are working on ... I discussed these things with them, they realised the usefulness of it; so that laborious attitude of the olden days, [in] our time, where we have to spend so many hours trying to come out with these same principles, the ICT or the computer has made it so fast, so accurate and so it's like you really know what you are doing [teaching], within some few minutes you should be able to come out with a very good work.'

Not only does **Lecturer 6** support collaboration in design with ICT in ideation, he also sees ICT as an arbiter, especially in the current situation.

'In fact I do the same thing with my final-year students during their projects. They bring their projects and I talk to them but what I've realised is the students when you say something and you don't demonstrate they don't actually know exactly what you are talking about. So the laptop is like an 'arbiter' in a way; its like what I'm saying the students are not getting it but the laptop is there so I demonstrate on the laptop and then they all like [laugh]; so before he leaves, initially he comes to my office and I shout on him and is like he is angry but before he leaves, he is smiling; because he knows exactly what I'm talking about.'

According to Wang (2010:176), within design education, 'the culture of the design studio might be described as a vital complex of material representation, social collaboration, creativity, emotionality and a tolerance for uncertainty—if not outright confusion—balanced with a faith that meaningful designs eventually will emerge'.

Wang (2010) believes that collaboration is a critical issue in design education within studio practice, and it happens almost always, both formally and informally. Quoting Gross and Du (1997), Wang (2010:176) accepts that ‘collaboration—at least in informal ways—almost always happens. Besides, collaboration is generally assumed to be fundamental to design practice’, so it is often incorporated as a requirement for the course.

Students in this case also wish to have some collaboration with both their peers and lecturers but seem not to have enough of that experience.

‘[...] [pause], we did; we certainly did [...] I’m seeing less of it now, definitely; much, much less of it now; these days you don’t see them at the studios; By the way, we already have three years behind us, so it’s kind of we can deal with that; so, yeah; lately we done with lecturers interactions; not available at all.’ [Belle]

But they desire and do use ICT for peer collaboration:

Always we do these discussions online; Facebook is a huge tool that we use; errmm ... often you create a group and people will add images on the group ... people will come out with an idea of some sort, and someone will come up with; like or that’s cool; why won’t someone try some idea in that or on that; and that kind of thing; so we have a great tool, and kind of bring all your ideas together ... and it is nice.’ [Darl]

The complexities of collaboration arise when some educators believe that such collaboration is only possible with face-to-face interaction with students in the physical studio, as **Lecturer 8** summed up:

‘I will perhaps be hesitant at this stage [...]; I think your design prowess will benefit with the human iterations; physical interactions with all the feel of see, taste, hear and smell; [...] that way will be a better idea where you can still come around intensively with all the questions and answers.’

However, he was quick to accept ICT for collaboration to some extent in the following statement:

‘I’m a proponent of that principle [Bauhaus] and I still deal with creativity,

conceptualisation and understanding the principle of the profession; what you must do and how do you do it; like I said earlier, the technology should be the manifestation of the idea or the opportunity to do a manipulation of your ideas; so certainly if the student and the master are equally proficient technologically they will still, up to a point, in terms of the experience, and the new student-master concept, almost the same as Bauhaus will continue; with the master with experience, will still be able to guide the student with the understanding that true learning would have taken place and even become greater than the master.' **[Lecturer 8]**

He further asserts:

'We can have a virtual studio now; in other words, people can be all over the world and all over the building, you know these days when we do layout and briefs for clients, we give it them on the platform they can understand and we get the feedback same; I think you can work with your student on any media like Skype or line network where you can see on their workstation, what they are doing by connecting to each other and so they can assess your workstation so one could direct; so the opportunity for a virtual studio is available to use for collaboration.....; so I think one needs to make sure that there is a virtual studio of that model so that they could be sufficient ...' **[Lecturer 8]**

While this respondent, and others of the same thinking, want to see graphic design infused with ICT, and want to collaborate with students through ICT, their traditional background experience makes the situation difficult to grapple with. For them, any such 'adulteration' by ICT will not yield the desired results in respect of graphic design pedagogy.

6.5.2 Traditional idea development

The complexities of traditional idea development are compounded by the backgrounds of educators. Whereas educators with a traditional background will not accept ICT for ideation, those with ICT background experience want to see ICT as part of the concept for ideation. Asked about his opinion on the assertion that ICT is denigrating ideation in graphic design, **Lecturer 3**, who is in his mid-thirties, and has

been teaching graphic design for four years, does not think that way:

'Well, I don't buy that argument entirely; I feel ICT helps in so many ways in the sense that as long as the lecturer is teaching idea development, the content itself can be facilitated through the use of ICT and then the feedback itself can also be done with the use of ICT. You need to know what you are looking for and know how to make use of the ICT. When used in the right way, I believe that ICT promotes the teaching of idea development.'

When asked further if by involving ICT in ideation, the core issue of idea development is not being veered off by students, he replied:

*'Oh yes, **students are now using [the] computer to develop their ideas; but we are not losing the issue entirely.** This is because I feel the idea, first of all, originates from the mind [heuristically] of the student before he/she moves to the computer but more at times it looks like [pause] err; traditionally it seems more advisable for a student to develop ideas by coming down with a series of sketches but now it is also possible and more convenient for a student to have an idea in mind and try and use ICT (like the computer, Wacom pads) and draw or develop the ideas and the person doesn't necessarily to have the paper or hard copy or pen to be able to put down the idea.'*
[Lecturer 3]

Another respondent, **Lecturer 7**, who has also been teaching for seven years and is in his late thirties, made the following remarks when asked his opinion of the assertion that ICT is denigrating ideation in graphic design:

'Well, I don't share in that view; I think ICT can help tremendously in the teaching of ideation by students. If we look at a class, it is the same ICT that helps us to be able to develop learning modules which are interactive and helps students to go beyond the traditional confines of teaching, to be able to get more in-depth knowledge, interact with learning modules and be able to gain more insight; ... so I believe that since ideation is part of the pedagogy, students will stand to benefit tremendously through the involvement and integration of ICT in the curriculum of ideation we pursue here'.

This is in contrast to the following remarks of **Lecturer 1**, who has been teaching graphic design for over 30 years, and is in his late fifties:

'Personally, I have some reservations on ICT even though it facilitates the learning process; but my problem is now there are already [...] icons, images already stored, you know... and people tend to use those instead of creating their own, okay, so the online [...] idea development or whatever, yes, it's very good but the tendency of the students to, you know [...] pirating on, you know, on people's ideas will be stronger. Because there are already, you know, stored images, which people can use.'

He justifies his statement with the following, reflecting his background experience:

'Well, my view... eh [pause]... taking it from my background [...] and the way we did things at that time, you know, it [the traditional method] gives us opportunity to actually explore our creative abilities; [...] it gives the opportunity to also experiment; okay! [...] So you know, during our time, for example [...], again as indicated earlier; in idea development, we were forced to ... in idea development, we were forced to, maybe work on about 40, 30 to 40 thumbnail sketches, you know; all different ideas, putting them together here and there.'

Students also are involved in these complexities of traditional idea development. Asked how often she uses the traditional idea development method, a student made the following remark:

'I usually don't do it [the traditional idea development] [...] not that I've not done that before, I've done that before but then as time goes on, I ... and with the works I've been seeing on the Internet and all, I just sit down, brainstorm, I think of what to do and go straight without doing any sketches on paper.' [Serwaa]

When asked about his views of feedback from lecturers, work done on the computer and that done by traditional methods, and which ones did lecturers prefer, **Serwaa** gave the following answer:

'For that ... I believe it can be both; because me for instance, I usually work with it [traditional idea development]; if for rendering works, I go by

the traditional methods with pencil; but I think a lot of people are now going with the computer ... like everyone will opt for it [ICT]; I think that is the system now and everyone is going by it but sometimes when you go the traditional way, it sometimes brings some difference to your works.'

On probing further, **Serwaa** was asked if lecturers were always ready to check the thumbnail sketches used for final designs since it is required that students should use traditional idea development, she responded:

'Sometimes but not all the time; ... [pause] but not all that rigid; you might not bring it but the almost finished work for discussions and juries is what is required.'

With this information, and against the backdrop that lecturers like students using traditional idea development, she was further asked how other colleagues are involved in using ICT to develop their ideas. **Serwaa** was emphatic:

'Most of them use the computer to develop their ideas; ...I will say about 70% will be for ICT usage.'

Another student, **Ike**, was also asked about his comment on work done with the computer, as far as lecturers' attitudes and design education was concerned. He indicated the complexity in the following remarks:

*'Yeah ... they [lecturers] like; **indeed they love it when they see the works; but [...] they sometimes doubt whether we did it by ourselves**; but with the hand, you will have every proof to show it is done by yourself; by you, yourself; but the work done with ICT, or the computer aided [...] they, they, **they sometimes have the doubts** as to whether we did it ourselves; [and sometimes they will recommend more marks for] the one who did with the hand than the one with ICT. Because of the reason that **they are not sure whether you did it yourself** ... Well, ...but I think ... it's [ICT] a tool; and if you are allowed to use it; the more you use then you will understand; and I think the world [...] the second thing is the world is changing and the, ... and the paradigm is being shifted to ... everything is done using the computer, ICT and stuff so I would have loved to go that line [without hesitation].'* **[Ike]**.

The complexities of graphic design education with collaboration ‘stem from the use of tools and strategies; no matter how ‘unrefined’ they may be, to reach a defined objective in the contemporary world of design’ (Appiah & Cronje, 2013:15). These involve a range of personal decision-making, design and creative activities, together with the use of preferred tools and strategies (Tan & Melles, 2010).

6.6 Influence of ICT in ideation: Ideation activities

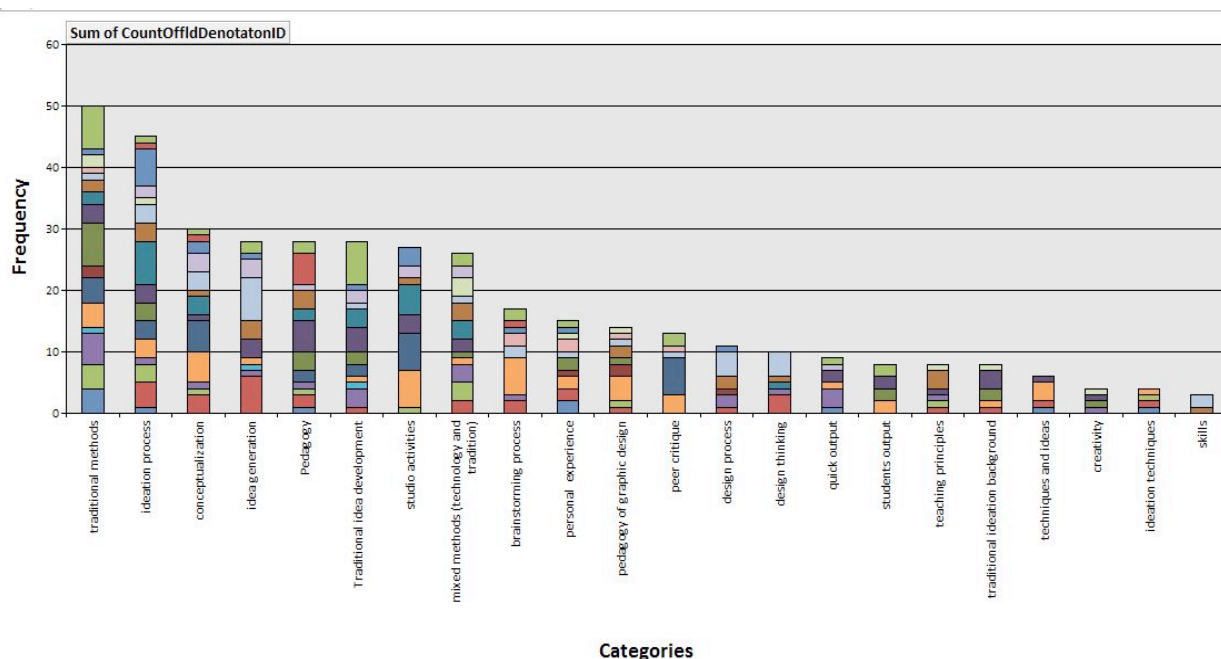


Figure 6.15: Categories from the theme of ideation activities

The unit of analysis of this project is the process of ideation that ‘directs the boundaries’ of the activities of ICT and graphic design, aiming to see the ‘patterns, relationship and the dynamics that warrant the inquiry’ of exploring ICT in graphic design (Henning et al., 2004:32). Major findings from the categories revealed that ideation activities were the main theme that emerged from the data. Significantly, it emerged that all the other themes were linked, one way or the other, to the theme of ideation activities. Ideation as an activity really anchored issues relating to tool usage, techniques of digital ideation and principles of ideation. In total, there was significant impact of lecturers in various categories within the findings. Lecturers’ reactions and interactions, attitudes and perceptions, were also significant findings that aligned with the activity of ideation, and these are discussed in the next section. Since lecturers are the key determinants of the success or lack of success of any ICT initiative, their attitude is quite significant in any ICT implementation. In their

study, Lim and Lee (2008) emphasised that educators need to change their traditional role in order to adapt to rapidly developing technology. The study realised that lecturers' traditional backgrounds of traditional methods were dominant in most of the activities relating to ideation.

6.6.1 Traditional methods

Traditional methods of idea development are still seen to be the driving force of the pedagogy of ideation, even within the twenty-first century. This is because most educators still believe in the pedagogy of the Bauhaus principles. This is re-enforced by the following comments from educators:

'Yes, [...] I'm a proponent of that principle and I still deal with creativity, conceptualisation and the understanding the principle of the profession; what you must do and how do you do it; like I said earlier, the technology should be the manifestation of the idea or the opportunity to do a manipulation of your ideas; so certainly if the student and the master are equally proficient technologically they will still agree up to a point, in terms of the experience; and the new student-master concept ... with the master with experience, will still be able to guide the student with the understanding that true learning would have taken place and even become greater than the master; indeed the fundamental thing is that people must see the computer or technology or what it is there for you to manipulate ideas ...; from day one till the last stage, and students must also understand that they must also be able to capture their ideas in thumbnail sketches, and down to the process and then to take it from there to work it up.' **[Lecturer 8]**

*'Basically you know for the designer to come out with any concept **he has to come out with a dream about it; then you develop thumbnails, per the principle [Bauhaus] then from the thumbnails you go to the research stage;** well, ICT will be useful for the research and then maybe at the finishing stage ... That is the best way to go about it.'* **[Lecturer 5]**

*'Well, I don't encourage them [students] on ICT; they use it after they have developed their ideas; they use the traditional method of pencil and sketchbook; but at the finished stage, they are free to use it. **But in idea***

development, my fear is that, they might not devote or spend too much time on it [ideation]... In some cases ... I ask them to do the traditional way before. Because, even in the traditional advertising firms, they still have the traditional ways of using felt pens, markers to give you the idea before the computer.' [Lecturer 2]

'Well, no [not inclined to ICT]; no in the sense that if the student does not know what brainstorming is and how to evolve, then there is the need to help the students understand how to evolve ideas so that should be the first step; and if the student appreciates how to evolve ideas the person should not use ICT; that is fair enough. But ICT is not the panacea.' [Lecturer 2]

6.7 Influence of ICT in ideation: Constraints and contradictions

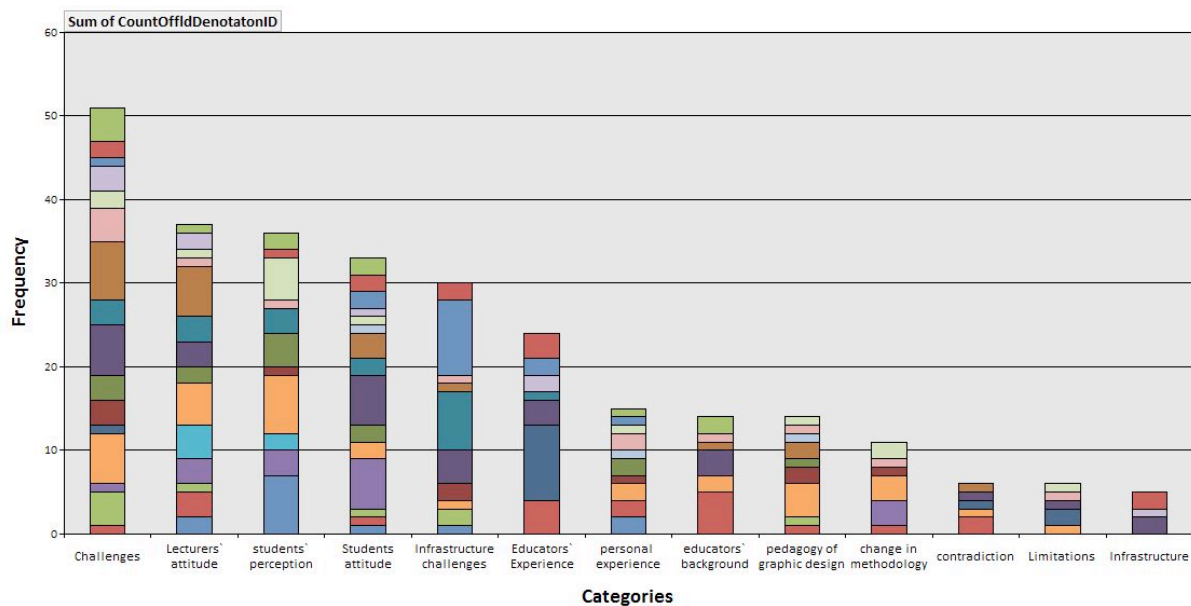


Figure 6.16: Categories from the theme of Constraints and Contradictions

Ideation in graphic design is geared towards finding a solution, not only to studio work, but also to real-life challenges as far as design is concerned. However, the inclusion of ICT in the ideation process also comes with pedagogical and educational challenges (Jaffer et al., 2007; Appiah & Cronje, 2013). These served as significant constraints for ICT use by students.

6.7.1 Challenges

This study reported challenges as one of the significant issues that confront ICT with ideation in a developing country. Some of the significant areas included challenges posed by traditional methods, infrastructure and pedagogical issues.

'I will say they [my students] are very much interested in [ICT] but they also see that the confines or the constraints associated with the traditional studio approach as we have here are largely impediment as they begin to engage with ICT in their studio practice...' [Lecturer 5]

'My challenges!! First we [students] are not being taught how to develop ideas using the ICT [...] and then; we supposed to be informed before we come to school that this is what we will need in school, as far ICT is concerned; that will be fine [...] they are supposed to encourage us to use more of ICT in class rather than the theory, theory, theory; because designing is more of practical.' [Ike]

'[...] That is not very easy to do [scamps] on the computer; we do scamps, yeah scamps and I think it is so important, [...] we generally scamp on pencil or pen or whatever on paper; [...] if you can scamp on the computer then you will need a Wacom tablet, to be able to write or draw on the computer and things like that we don't really have them available to us.' [Belle]

'I think in this department, most of the lecturers; they prefer using the traditional method; and this is our problem.' [Ben]

'We are counting on certain input from the university, regarding the technical aspects of the process like bandwidth size, the relevant software etc.' [Lecturer 5]

6.7.2 Lecturers' attitudes

As mentioned in Section 6.6, lecturers' attitudes and perceptions were also significant findings that aligned with the activity of ideation, and these attitudes posed some of the challenges in the exploration of the inclusion of ICT in graphic design education. Phelps and Maddison (2008) cite Duncan, 1997; Matthew,

Callaway, Letendre, Kimbell-Lopez and Stephens, 2002; and Rogers, 1995. According to Phelps and Maddison (2008), in almost all instances of these works, 'teachers' values, attitudes and beliefs ...' have been cited as significant contributing roles influencing teachers' preparedness to embrace ICT.

Findings show lecturers' attitudes of not aligning the pedagogy of graphic design to current happenings were interpreted as antagonistic by some of the students.

'Well, I don't see how; [...] they [...] No, they don't; they allow you to find your own way of developing ideas; but so long as the concept is okay with them; it's fine.' [Ike]

Also, especially when lecturers have doubts as to the capabilities of students using ICT for ideation:

*'You [students] **should prove beyond all reasonable doubt that you are academically good**, you will have a portfolio which shows that you have the skill and the interest; because the training will come with its challenges and if you are not prepared mentally and physically, you will not survive. So **our students are not mentally and physically up to speed in terms of studying** at the university; that is the problem we have with our students. But take that aside, the process [digital ideation] is very, very important.'* [Lecturer 5]

Attitudes of educators seem to be highly problematic in the adoption of ICT in design education. This situation creates an issue of conceptual confusion that manifests itself in educators' looking backwards at what might be lost, rather than forwards at what might be gained, especially with ICT in ideation (Long, 2008). Long decries educators' insistence on retarding innovation with ICT as relating to design education, and complains that there is a sense in which the oft-repeated statement that we are judging a new technology by old understandings seems to be very accurate (Long, 2008). Phelps and Maddison (2008) also admonish teachers 'to hold values, attitudes and beliefs that will lead them to support ICT integration initiatives'.

6.8 Influence of ICT in ideation: Mistrust and misconceptions

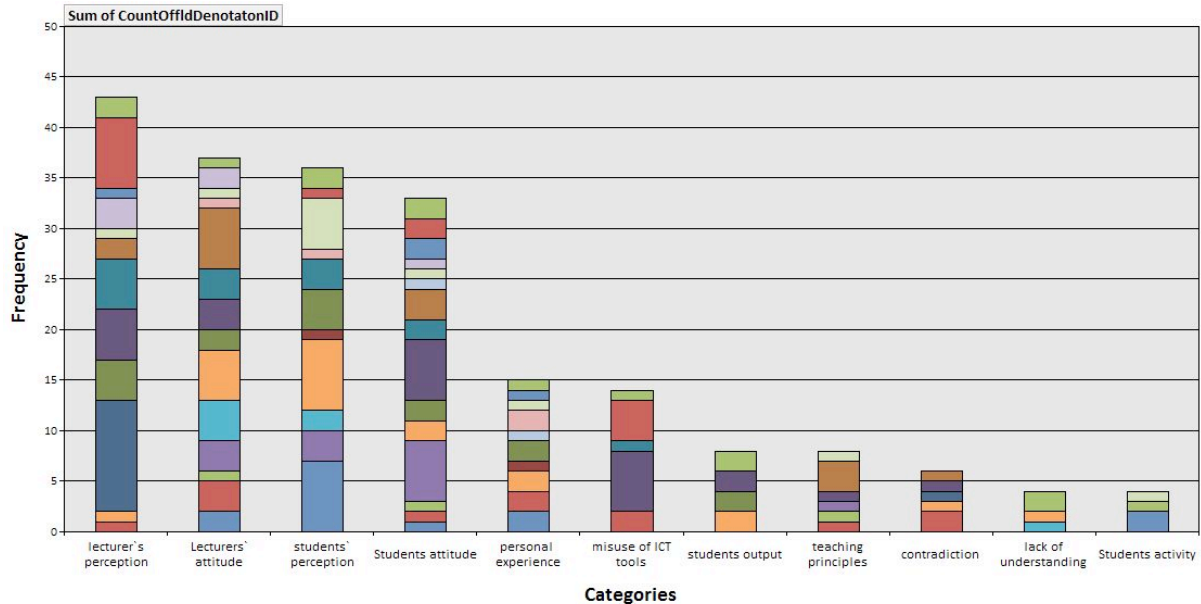


Figure 6.17: Categories from the theme of Mistrust and Misconceptions

6.8.1 Lecturers' perceptions

The theme of mistrust and misconceptions (Figure 6:17) is born out of attitudes and perceptions of both educators and lecturers in this case, with 'lecturers' perceptions' being the main significant category. Researchers agree that educators' reluctance to engage fully with ICT may result from educators' perceptions, with students also sharing teachers' perceptions about the appropriateness of ICT to their learning and in the arts (Radclyffe-Thomas, 2008). Some remarks expressed by one of the lecturers concerning their mistrust of students' activities are as follows:

*'I think, personally ... it is important to get students to become critical thinkers first before you expose them to certain kinds of technologies in the sense that, **people imitate and copy a bit too easily when their objective is to do well in assessment.** And if we do not manage that process well, you might get students who will or might have assess to materials who you yourself might not have access to and can present that as genuine work done which might not necessarily be, because they know they can always get the product and do the "reverse engineering" and work back as if they did the work whereas in actual process; you*

*might be clever enough to see the links between what they are doing and what actually they might have in front of **them but you could still get a few clever ones to escape if you are not vigilant**, ... they could be more discreet or more discerning in the choices that they make online.'* [Lecturer 4]

It can be deduced that such a perception seems to delay the adoption and proper use of ICT in the pedagogy of ideation.

*'...I must also say that in industry and the forums that I'm engaged in I **still get the sense that the hand skills is still the basic fundamentals and must still be taught and need to be consolidated** at the first year... you must be able to actually visualise an idea of the problem, you must be able to put it on a paper in a rough form by thinking...' [Lecturer 8]*

There are also educators' perceptions that raw talent can only be harnessed by traditional methods:

*'... Remember the student comes in **not knowing how good or bad he is as a designer**; he comes with a God-given talent and potential and that needs to be developed usually almost in a group setup and individualisation; and then one also looks at specialisation emanating from a very strong basic foundation, after three years we can see areas like illustration, photography and others that can feed into other further studies, where technology will then be vigorously applied and technologically that will be deepened ... but certain basic fundamentals must be inculcated; design fundamentals, design principles.'* [Lecturer 8]

In such a scenario, he still believes ICT will have to be adopted at a later stage; that is, if it is adopted at all, but not for beginners.

'I will say if I have my way, let's say a 3-year course, I will say [adopt ICT] very early in the second year, if not very late in the 1st year; well, 1st year I will see how one can use computer for theory subjects, word processing and this general layout, how to type and the rest but for computers for design, I will say early in the 2nd year; maybe expose them

in the late 1st year.' **[Lecturer 8]**

Students' statements also echoed the perceptions of lecturers, who think ICT might contribute to students' not doing the right things:

*' [...] I think its silly to think that way! Yeah, silly **for the lecturers to think that way; that students might be stealing works or something like that**, because as a designer I think there is nothing better than having your work up there and seeing it as yours...'* **[Belle]**

*'I think for this lecturer (well, I don't know if I should mention names) well ... So he prefers using the traditional method; err ... **the reason being that [...] most of us are not good with the traditional so they want us to develop our ideas from the traditional methods** before we move to the ICT, so I think the problem will be, we not being able to come out with good designs.'* **[Ike]**

'Well I think its [...] ICT is an area that is more promising because as I said earlier, you can't do away with any of them; the ICT is an addition there to enhance the existing one, so lecturers shouldn't look at this as a threat that this one makes you [students] lazy or something; but that ICT really helps you to enhance your abilities; and that helps me a lot.' **[Jimmy]**

6.8.2 Lecturers' attitudes

Tied to perceptions, is 'lecturers' attitudes', which was also one of the significant categories within the theme of 'Mistrust and Misconceptions'. The study indicated that most of these perceptions created attitudes that were either antagonistic towards ICT use or reinforced the complexities of ICT use.

*'They have **been more biased towards [...] ICT [usage]**.... From second year, when we started [...] the computer studies, and **you tend to use the computer to do your work, they may think you have not done enough**; as long as he doesn't see them in your sketch book; and says he wants to see you working in the sketchbook; **so if you don't do a lot of sketches, drawings [...] in your sketchbook then it's like you haven't done anything**; because it's more of the process and he wants*

to see what you have done in the sketchbook, rather than asking you how you went through or the process you went through in arriving at your current position or process; and personally it has affected me sometimes in my marks in the second year before.' **[Jimmy]**

Not all of the lecturers' attitudes were antagonistic. Some were surely for the support of ICT pedagogy and are ready to support it.

*'Well from my own point of view some of **the students say they are comfortable using the stylus or even rendering with the mouse like working on the PC and others are also comfortable with drawing but they eventual scan and work on it further**; but then if you draw and scan you still use the computer mouse to do the drawing using the digital tool so [eh] ... so you can just start from the manual and as you go along you introduce the digital.'* **[Lecturer 8]**

'It makes it even more comfortable for me to use ICT and to be able to reach a large class of that nature [about 100] at the same time because with the use of ICT you can meet the large number at the same time without necessarily attending to an individual one at a time.' **[Lecturer 3]**

'I will say yes, I do have some high expectations about ICT ... of research, expansion of the knowledge, barriers, and goalposts and so on.' **[Lecturer 7]**

6.9 Influence of ICT in ideation: Pedagogical challenges

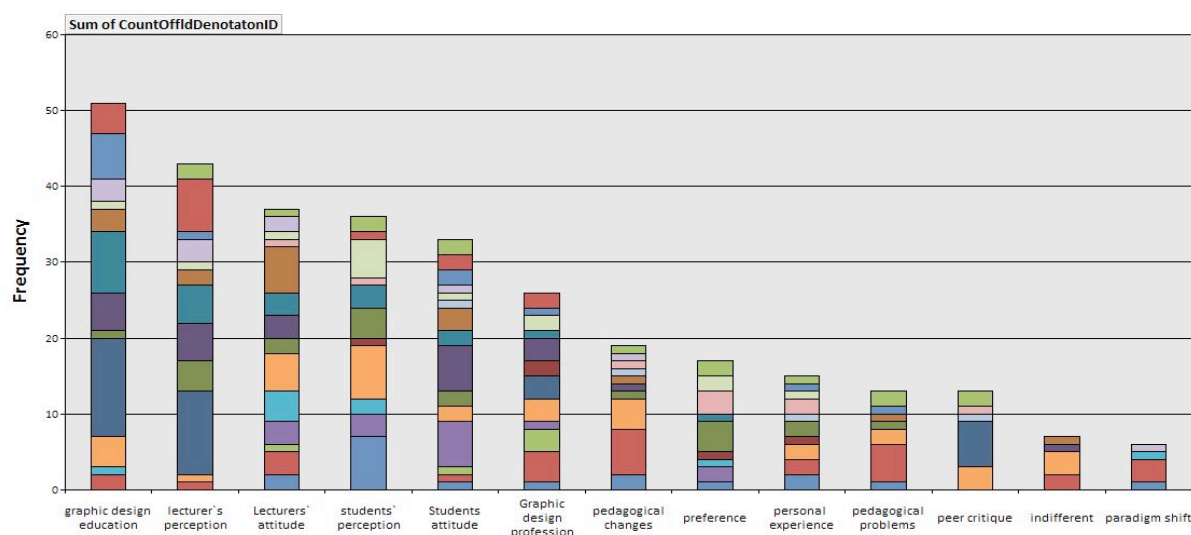


Figure 6.18: Categories from the theme of pedagogical challenges

Even though ICT presents pedagogical challenges in the educational system, especially when it comes to design, it appears graphic design is highly individual. As Reffat (2008) admonishes, the basic structure of the design education programme needs to fundamentally change in order to fully realise the new opportunities and changing perspectives offered by information technology (Reffat, 2008:900). A study to determine the extent to which graphic design students are inspired by Information and Communication Technology (ICT) in their ideation process in a university, highlighted the pedagogy of graphic design education, especially in the area of idea development, to reflect the emerging trends of ICT in graphic design education in developing countries (Appiah & Cronje, 2012).

6.9.1 Graphic design education

The pedagogical challenges in graphic design education need to be tackled aggressively and systematically, and as **Dave** pointed out in his response to a question:

'I think in this modern and 21st century that we are [in], and everything is about ICT so they [lecturers] can help us, err ... develop the ICT aspect [of our training] to the highest level; I think it's gonna help us a lot as graphic designers.'

The following statement from **Lecturer 9** echoes the dynamism of graphic design education:

'[...] I don't think sitting in the classroom for a very long time is the key; I think that [...], one tries to deliver as much knowledge background and inspiration as one can; either in the classroom or going out to the field trip or exposing them [students] through various means like the video, or like a lecturer or a guest speaker, or a visit to the area [professional studio], so first of all I prime their minds with that; [...] and then; [...] I think the spontaneous way to get an idea on a piece of paper is to do a little rough; drawing – just a simple thought and then you look at that simple thought ... and it changes the initial concept; and sometimes and often times we just download the concept because they [students] haven't found the best way of realising the concepts'.

She goes further to share her concerns about the pedagogical challenges in graphic design education as follows:

'I'm not all that concerned with how they [students] generate ideas; so long as they work with strategies and whether the design strategy is looking good; and I will say at fourth-year level, your idea has to be pretty original and innovative and so that is what we will be looking for at fourth-year level ... It's a whole new ball game; so at this point in time we're half way; we've got some sort of hybrid model where ... they are exposed to these different forms of platforms and so for them, you could take up one and drop the other; because the other is an easier and seems to be more about 'sure thing'; and the use of ICT makes it look more professional and more finished, then they are not confident enough to use their traditional skills; I can see where ... yeah and in other words, I think it is a good possibility of maybe introducing it earlier but then we have to be critical in the approach in using it.'

To overcome some of these pedagogical challenges, Reffat (2008) advocates a curriculum that merges information technologies into existing courses more progressively than is typical today, and at the same time looks to the studio teaching method as a catalyst for shifting perspectives on the relevant areas of design theory and methods (Reffat, 2008:900). He goes on to propose a 4-primary framework for effective utilisation of IT in design education.

6.10 Discussion

Data from the questionnaire—both from students and lecturers, combined with other qualitative data of observation and interviews, revealed some outstanding findings. The processes of teaching and learning, from thumbnails to the final design (both initial and digital), and how students went through their ideation processes, identify that ICT inclusion created pedagogical challenges in the pedagogy of graphic design. Even though ideation is ‘the process of generating, developing, and testing ideas that may lead to solutions’ (Brown, 2008:4), one engages with the mind more than with tools in the process of brainstorming, organising, sketching, thinking and imagining a view to creating ideas for implementation. Findings from the quantitative data indicated that students use about 70 percent of ICT tools to realise their objectives and outcomes during the ideation process. These included computer technology, Wacom tablets, cameras, the Internet, scanners, and relevant software for sketches and drawings, and also for refining the images, which were mainly for the ideation process. Students used appropriate software to sketch and fine-tune their sketches, leading to further conceptualisations for brainstorming in the ideation process. Educators also support ICT in ideation in graphic design with various aspects of technological innovations. The qualitative data reveal complexities that are adrift with the pedagogy of ideation in graphic design.

Data from the findings also indicated that during brainstorming and ideation, some ideas were easily captured with pencil on paper, while others were captured digitally; there was no indication of a large numbers of sketches needed in reflection of the pedagogy of design (Hodge, 2009). Moreover, documents indicated that the final design solutions also did not reflect in the smaller number of thumbnails seen from the sketches, even though the designs indicated ‘great’ ideas from the brief. The analysis also indicates that ideas can and do emerge, even during briefing and when students are using ICT for initial brainstorming. Such activities do create pedagogical problems leading to mistrust and misconceptions from lecturers, since ideation requires a follow through of sketches to arrive at the design solution. This also is as a result of lecturers’ backgrounds in traditional ideation pedagogy. Traditionally, the designer’s way of thought has to go through the design process to communicate effectively—problem identification, brainstorming/thumbnailed sketches, roughs, finished rough/comprehensive, and the final design—will have to be followed through according to the adopted rules. The complexity of the design

process, which indicated no precise and fixed formulas that bring together form, function, and context conditions, was revealed.

From the analysis, students engaged with the Internet and other software applications to realise their concepts and ideas. Unfortunately, lecturers could not monitor these processes, since the number of students in class exceeded the requisite number that traditional pedagogy can support, and there is an appropriate pedagogy for ideation processes with ICT. This situation, according to the analysis of data, does create complexities of a paradigm shift for graphic design education that seeks to replace the currently dominant positivist paradigm with a newer paradigm based on ICT with constructivism. Such complexities are part of human-computer interactions and the use of tools and strategies, no matter how 'unrefined' they may be, with the objective of reaching a defined objective in the contemporary world of design education (Tan & Melles, 2010; Appiah & Cronje, 2013). This is because students are using ICT to try out new types, layouts and manipulation of images on the computer, and are engaged in vigorous ideation processes based on iterative analysis—design, development, implementation and formative evaluation (ADDIE) —similar to the traditional method.

The findings also indicated students' persistence and optimal use of ICT in graphic design. Students view technological tools as something beneficial to their long-term profession and cannot ignore them (Yeoh, 2002). These technologies are seen as conceptual tools in their ideation process in graphic design education, and students see themselves being trained for the profession, which has now become technologically driven (Jonson, 2004; Jonson, 2005; Tan & Melles, 2010). Significantly, the majority of the students were in their early twenties, indicating that these are 'Generation Y' students. Characteristically, Generation Y grew up with technology and will rely on it to perform their jobs better. Their dependence on ICT for their work is of considerable significance. Students will not hesitate to do everything possible to make use of technology and are even willing to teach themselves to have the knowledge so they can use it for their ideation process.

In situations where the university does not offer adequate formal opportunities for promoting computer skills within the pedagogy, students are eager to sacrifice time and money for the acquisition of ICT knowledge. This can also be attributed to the fact that 'ICT skills are not taught as a distinct activity ("just-in-case"), but are

acquired “just-in-time,” in the context of activity that is meaningful to learners’ (UNESCO/COL, 2004, in Wilson-Strydom et al., 2005:2). The analysis also indicates that the use of ICT in the pedagogy of ideation is paramount, indispensable and should be strongly linked with the promotion and survival of students in the graphic design industry.

For lecturers, the analysis indicated that ICT is used in the preparation of traditional lectures most of the time. Even though some lecturers were engaged in the use of ICT for collaboration with students, there were several instances where educators did not want to compromise with the use of ICT in the pedagogy of ideation. There was also evidence of lack of innovation in education as far as ICT is concerned, since the majority of lecturers did not provide instructions to students using ICT (Thorsteinsson et al., 2010).

Analyses from both the quantitative and qualitative responses indicate lecturers appreciate the effectiveness and use of ICT, especially when it comes to large classes. They agree that ICT can help in managing these large classes and offers better opportunities for providing more individualised instructions to students; yet are reluctant to accept the use of ICT as a result of some prejudices, perceptions and mistrust. They also believe and agree that ICT is actually enhancing the teaching outcomes of ideation in graphic design, a revelation that supports the idea that ICT offers the support needed for collaboration by students in their group activities (Spendlove & Hopper, 2004; Margolin, 2007; Page et al., 2009).

CHAPTER SEVEN

SUMMARY, CONCLUSION AND RECOMMENDATIONS

7.0 Summary of the research

The situation of ICT interlacing with the ideation process in graphic design education set the stage for investigating how ICT affects its pedagogy. This was against the backdrop that researchers in design, specifically in professional architecture and engineering, believe that ICT enhances the teaching and learning of design (Wang, 2011). The rationale for the investigation was that the adoption of ICT at the various stages of problem solving has not reflected in the teaching of graphic design, especially in ideation. It is against this background that the research posed the following main questions:

- **What happens to the teaching and learning of ideation in graphic design when students begin to use ICT in direct contrast to traditional graphic design pedagogy?**
- **How do ICT methods affect the pedagogy of ideation in a developing economy?**

These questions also necessitated the following sub-questions:

- How do graphic design students and educators perceive ICT in the pedagogy for ideation in graphic design?
- What informs the use of ICT by graphic design students in their ideation process?
- How does the introduction of ICT affect the teaching and learning of the ideation process in graphic design, especially in the modern studio?

These were based on the hypothesis that students will sidestep and distort the process of ideation as long as intense educator/student interaction in ICT and in studio work is not assured. This hypothesis was explored, together with other hypotheses, to find answers to how the introduction of ICT has altered behaviour towards design processes in the studio/classroom, particularly regarding ideation.

In Chapter 2, there was evidence from authors, in the literature review for the study, that shows that technology has permeated every facet of graphic design: both in teaching and learning as well as in the profession. The literature review also sketched a situation of the impossibility of practising graphic design without the use

of technological resources, from idea development to final execution of the design solution. There was ample evidence of computer technology's becoming one of the tools of ideation, with empirical facts showing how professional and student designers will rely very heavily on technological tools and techniques to make sense of their ideation within their respective design tasks.

Chapter 3 provided the theoretical underpinning of the research. Based on the idea that graphic design is based on educational research with ICT intervention, learning theories and ICT in learning as cognitive, activity theory was employed as a lens to explore the complexities of the activities and experiences of the everyday activities of the students and lecturers of graphic design as they interacted with ICT in their ideation processes. The use of activity theory was based upon the philosophy that people develop systems and use tools to facilitate their activities. These tools include software, hardware, and ideas. As people refine their tools and add new ones to solve problems more effectively, the activities they perform using those tools can change—and vice versa; as their activities change, people use their tools differently and modify their tools to meet their changing needs.

Chapter 4 outlined the strategy adopted in answering the main research questions, opening with the philosophy of the research. It focused on the specific research methods, research instruments chosen for different phases, data sources, and the tools used, and how data was managed and analysed. Factors that enhanced the study's credibility and trustworthiness, including ethical considerations, were also discussed.

From the descriptive statistics from the quantitative data, as well as the qualitative aspects of the data, the use of ICT in the ideation processes in graphic design was established. Various responses from lecturers and students provided data to support the use of ICT during various stages of teaching and learning ideation in graphic design education. Empirical evidence provided good access to computers and use of ICT methods by students, especially. Various perceptions on the use of ICT by students in ideation activities for graphic design education and how ICT is informing ideation were also captured through the data.

There was also enough evidence indicating that students and lecturers see ICT as something indispensable in the pedagogy of ideation in graphic design education.

Lecturers appreciated the effectiveness and use of ICT, especially with regard to large classes and agreed that ICT could help in managing these large classes (**Section 5.6.6**). For the lecturers, ICT offers better opportunities for providing more individualised instruction to graphic design students (**Section 5.6.9**). However, lecturers were reluctant to accept the use of ICT because of some prejudice. Students envisage ICT becoming a reliable partner in the design process as discussed in the literature, and desire its use in the ideation process. For such students, ICT is seen as integration, decision support and a design tool (Reffat, 2008), as well as a digital ideation tool (Stones & Cassidy, 2010). Even though the teaching of ICT and its related skills might not be part of the curriculum of graphic design in developing countries, with regard to this case study, students were able to learn the various tools and software needed for the use of ICT, irrespective of lecturers' unwillingness to accept ICT. The results were the various tensions and contradictions that were witnessed through the framework of activity theory.

7.1 Methodological reflection

The study was designed as a multi-methods study, since both qualitative and quantitative approaches would provide a more complete understanding of the research problem than either approach alone. This methodology allowed the collection of both quantitative and qualitative data sequentially, later integrated for the interpretation of the data. The quantitative data were from students and lecturers, while qualitative data were obtained through observation, documentation, and interviewing lecturers and students who were actually involved with the phenomenon explored. The lecturers involved had been teaching with varied background experience in graphic design, while the students were in their third and final (fourth) years. The interpretation provided both quantitative information about magnitude and frequency, as well as qualitative information on individual perspectives from participants and the context in which they were commenting on the research problem. This was done within the framework of Activity Theory as a lens in the data-gathering process, with direct focus on ideation as the unit of analysis.

7.2 Substantive reflection

This reflection deals with the issues that speak to the main research questions posed within the study. Yeoh (2002:237) had earlier investigated the influence of computer technology on the design process of ideation, among undergraduate

graphic design students. He concluded with the conviction that technology is needed to make things easier for designers, but at the same time creativity is needed for them to be different and to excel, despite the content, context, and objectives of the design problem they are trying to solve. What Yeoh (2002) seems to suggest is that, in the desire for educators to teach as priority, the principles that shape the creative abilities of students, technology should not be discounted. Even though Yeoh's study was conducted in the US and pointed to computer technology as 'actual intelligence' that augments human problem solving (Yeoh, 2002:222), his assertion that changes in educational skills and methods are now more important than ever before, can also be applied to developing countries. Empirical data from my study proved that developing countries are also embracing ICT technology to cope with challenges in teaching and learning, especially with large class sizes. Beyond this, the study in this case also revealed pedagogical challenges as one of the problems of graphic design education which developing countries should seriously consider when embracing ICT in ideation.

Wallis et al. (2010) also have a similar view in their study of Australia's experience with architectural education, especially with studio pedagogy: 'It is important to acknowledge that the processes of designing and how to teach design are largely based on the profession's tacit knowledge and experiences' (Wallis et al., 2010:1). The researcher having explored the pedagogical precepts, this case also proved that the nature of graphic design work is always time bound, and designers need to find the quickest, most creative, and cost-effective way of meeting the communication needs of clients. According to evidence from this research, this situation pushes students, who also view graphic design as a professional course, and are always tuned to what pertains in the profession, on how they might one day impress clients. Hence the un-pedagogical methodology of using ICT for ideation.

There were significant revelations of the development of the graphic design processes of using ICT in ideation. Ultimately, they were revelations of complexity of the design process for which there were no precise and fixed formulas that bring together form, function, and context conditions, and which gave credence to the orientation of pragmatism in terms of epistemology which the study ascribed to from the beginning.

7.2.1 How do graphic design students and educators see the use of ICT in the pedagogy of ideation in graphic design?

There was ample evidence that computer technology has become one of the tools of ideation, in some situations, a 'thinking tool' (Stones & Cassidy, 2010). This was made possible from discussions on activity theory, which was used as a lens for the framework of the study. Perceptions about students' *using computer technology to do most of their ideation activities* were also seen not to be the case, as captured by the quantitative responses. Students were emphatic that they did not rely only on traditional methods for ideation; neither did they use computers for all their work as far as sketches and brainstorming were concerned. There was evidence to show that they mostly combined traditional ideation processes with ICT methods, perhaps for pedagogical reasons (Appiah & Cronje, 2012).

7.2.2 What informs the use of ICT by graphic design students in their ideation process?

Findings from the study show that graphic design students accept ICT as indispensable in their ideation process. ICT is also seen as a support for integration, decision support and design tools (Reffat, 2008), as well as digital ideation tools (Stones & Cassidy, 2010). The implication of this is the issue of students' resorting to the use of ICT in every way possible to enhance their ideation activities. However unconventional this process might be considered in the pedagogy of graphic design, students will find some space in their activities to use ICT for ideation since they are exposed to that technology. Even though the teaching of ICT and its related skills might not be part of the curriculum of graphic design in developing countries, as far as this case study is concerned, students will learn by themselves and use ICT, no matter how their lecturers might view it. These issues are the bedrock of various tensions and contradictions when viewed from the lens of Activity Theory, as discussed. Findings from the study support the issue that, for enthusiast students, ICT 'will help transform them from being passive and uncritical receptacles of past knowledge into being active and creative learners' (Wang, 2009:208).

From the findings, students see ICT and the computer as augmenting the pace at which graphic design problems can be solved and allowing designers to work more resourcefully. Such a revolution means a great deal in training students with the right skills to perform in such a technological market. The profession now requires designers who can apply the right methodologies to solve the current design

problems that include motion graphics and interactive media. Exploration of the pedagogy of ideation is particularly critical to educational research where the object of its enquiry is not simply knowledge of ICT, but how ICT knowledge could be used in the ideation process. Such knowledge will be responsive to the current or emerging needs of practitioners and ultimately to the solution of professional and educational problems (Richey, 1998:7). Moreover, research on the effects of ICT on learning are variable and inconclusive (Jonassen & Reeves 1996; Ungerleider & Burns, 2002). Perhaps educators and researchers need to focus on the issue that students need to be taught how to seek out new information for their designs, think critically, and show initiative, given the challenges of the fast-changing world of ICT. The era of digitisation in the graphic design profession leads me to answer the next sub-question: 'How does the introduction of ICT affect the pedagogy of ideation, especially within the current studio'?

7.2.3 How does the introduction of ICT affect the teaching and learning of the ideation process in graphic design, especially in the modern studio?

Two decades ago, Ward (1990) attacked the traditional studio concept for its 'hidden curriculum'. He did so because he believed that the hidden curriculum ran contrary to current educational processes and reinforce the 'hierarchical, top-down models of authority of most institutions, and inhibit truly independent thought' by students (Ward, 1990). Evidence from this study revealed that the use of ICT should facilitate the democratisation of studio activities, with students now able to freely develop their own style. This study also contributes to the recent call that ICT should be seen as a catalyst that links the pedagogy of ideation and facilitates greater collaboration between educators and students, especially in classes with large numbers of students. The democratisation of the studio context will mean allowing students the freedom to develop their own style of designing, using tools they feel best in making their own meaning. This way they will be learning from the results of their actions and inaction of the tools. ICT within the studio provides a useful model of self-lifelong learning for graphic design students in the process of ideation, as the data reveals in the study. Within the current studio, ICT assists in terms of motivating and structuring collaboration, especially with group-based project methods of teaching. There was enough evidence in the study to show that students view collaboration (among peers and with lecturers) as something very important within the studio, but do not seem satisfied with the current situation (**Section 6.2.3**). Where collaboration

and interaction occurred, there was some sense of satisfaction among students and lecturers, as a result of the ideation process. Finally, evidence from the study supports the issue that, in its context, structure, pedagogy and nature, the 'studio' has seen some transformation from the pre-nineteenth-century master/apprenticeship model influence, and is now experiencing digitally-oriented and virtual type in its professional and educational settings (Kolarevic et al., 1998; Kvan, 2001; Schnabel & Kvan, 2001; Reffat, 2007).

7.3 Scientific reflections

The major contribution of this study is the realisation of various complexities in the ideation processes with ICT, as reflected within the framework of Activity Theory that was used as a lens for the study.

7.3.1 Contradictions in the activity system of ideation

In **Section 6.1**, the study revealed contradictions that were captured in the classroom setting. The study also revealed activity systems of ICT integration as something that created contradictions in the whole activity. These are processes that are not necessarily stable and harmonious. These contradictions were characterised by activities of collaborations and use of ICT by students on the one hand, and lecturers on the other hand. Lim and Hung (2003) remark that contradictions are developmentally significant and exist in the form of resistance to achieving the goals of the intended activity and as emerging dilemmas and disturbances. Contradictions are also central to the theory and exist when external influences change elements of activities, causing imbalances between them (Issroff & Scanlon, 2002:78).

Evidence from this study indicates that resistances in the activity system were inevitable, since there is not any planned system of integrating ideation with ICT. Lim and Hung (2003) identified two types of contradictions when investigating ICT integration in Singapore schools—primary and secondary contradictions. The primary inner contradictions exist in each component of the activity system, whereas the secondary inner contradictions appear between the components of the system (where an activity system is connected to other activity systems through all of its components). The case study contradiction experienced was when students started involving ICT for ideation and this was extended to other areas. Typical situations were when lecturers who had to effectively manage the class to achieve the intended object of facilitating the construction of students' knowledge, became

overwhelmed by the management of ideation as the object, because they could not track students' activity of ideation with ICT. With the introduction of ICT, this primary contradiction becomes worse, because lecturers have to manage the application of ICT and also monitor students more closely as learner control increases. This situation also develops some latent tension between students who are willing to impress by using ICT, not only for brainstorming and ideation, but who also find ways of managing the design and processes of ideation.

The use of ICT and computer technologies offer students the flexibility of developing ideas that dovetail to specific design outcomes conveniently and quickly. For educators, it sometimes creates flexible schedules and the possibility of demonstrating some techniques in developing ideas (**Section 6.4.2**). ICT affords students the flexibility of collaboration when they are not together as a group, and the ability to meet scheduled deadlines as required by courses.

Whereas the use of ICT and computer technologies are seen as something positive, especially with the set objectives of producing a creative work, using ICT tools also ignites other contradictions. That is because the introduction of computers and the Internet to meet the demands of time and flexibility subsequently means that adaptations are needed to other components of the activity system. Those adaptations can result in a form of learning that breaks with traditional forms of ideation. The break or disruption can be a good thing if the new form allows more culturally and socially advanced activity to take place. But the break can be a negative one if, with the introduction of the new tool, other components of the activity system do not adapt to take advantage of the possibilities the new tool affords. This might result in inner contradictions when there is a conflict between the processes of engaging the rules of traditional idea development. The role of the studio and other issues of peer critiques—seen as different members of the community in the traditional classroom—may also conflict with the role required in ICT-mediated activities. This is because the required pedagogy of ICT that will stimulate collaboration within the virtual studio, allowing actions of enquiry and exploration from peers and educators, and even the resources from the Internet, are seen to be challenged, resulting in a secondary contradiction between the community of practice and division of labour, and tools and division of labour become difficult to manage. The facilitating role of the lecturers in ICT-mediated activities conflicts with their traditional roles of information dispensers and authoritative experts of

knowledge. It is in such situations that the pedagogy of constructivism becomes relevant, and possibly an answer to the question by Wang (2009) of persistent failure to find a link between theory and practice and the difficulty of training teachers to use ICT creatively (Wang, 2009:211).

7.3.3 Issues of transformation in ideation activity

There are other contradictions that become evident between students as subjects culminating in different ideation systems—transformation of the activity to achieve the required objective is the issue of transformation. Since activities are not isolated units, but nodes in crossing hierarchies and networks, which are influenced by other activities (Issroff & Scanlon, 2002:78), using ICT for ideation by students triggered other difficulties like true assessment that reflects on students' performance.

The issue of transformation as reflected in the activity theory seems to be linear as indicated in the arrows of interventions. Subjects trying to reach their outcome through the objectives create a linear transformation. However ideation in graphic design does not clearly reflect a linear transformation of ideas and strategies (Tan & Melles, 2010; Kruger et al., 2006; Cross, 2001; Cross & Cross, 1995). In this case study, there were instances where through observation the systems were always looping back. At every stage, the activity loops back and forth and thus were imparting on each other. Even within the ideation activities, processes of ideas seem not to be linear but will always be iterative and will be looping back and forth. These transformations of 'looping back and forth' are also encouraged by constructivism and also create situations that allow students to gain knowledge in their own discovery process, often quoted as; 'students should construct their own knowledge (Wang, 2009). This study acknowledges that using ICT allows students to search and apply their own creative thoughts, together with principles, even within the contradictions of activity enquiries. The activities were, as witnessed, saw every item relating to each other and looping back and forth. Even though students were expected to submit a final work (an outcome), there are no indications that the outcomes of the works were affected by the activity of ideation. However, there were many indications of all activities being affected by the ideation processes, which also experienced much complexities and tensions as captured in Figure 7.1.

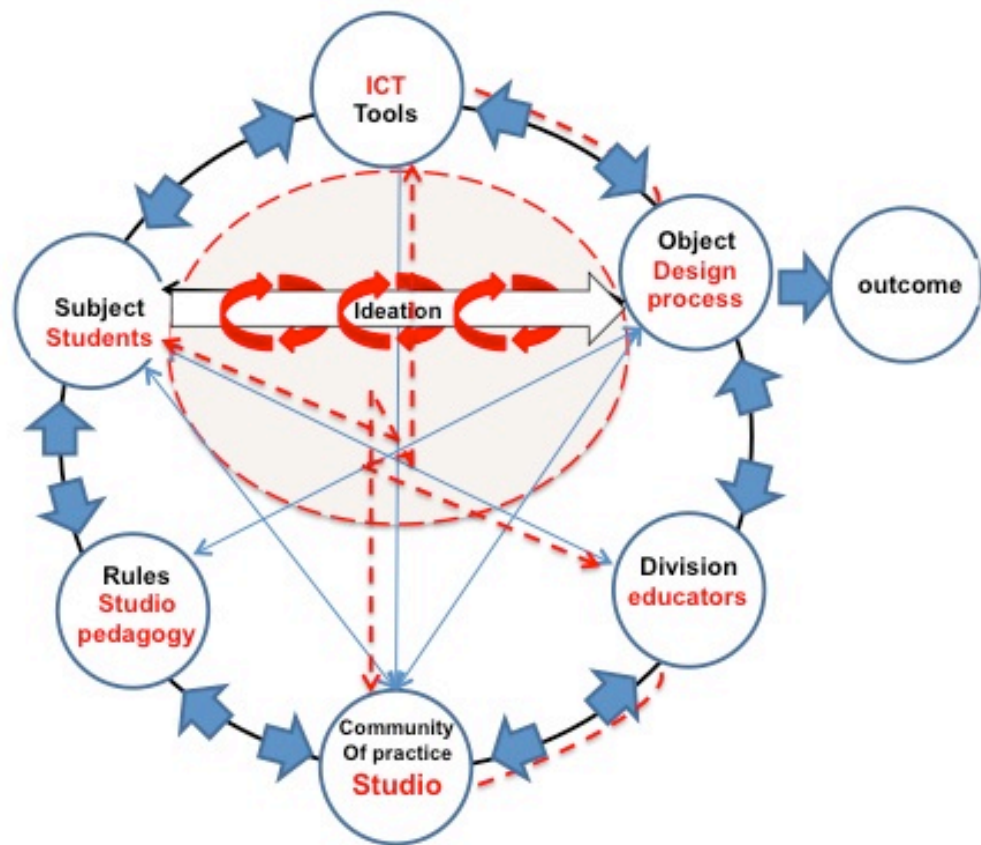


Figure 7.1: Transformation of the activities as captured in the study

7.4 Recommendations

The research was done, not to elicit what educators were doing wrong or what students were doing right. Rather, it was to explore what happens when ICT comes into contact with the traditional pedagogy of ideation, especially with graphic design; what value students put on ICT in their quest during brainstorming processes; how such applications impact on the activities of both students and educators, especially when developing countries are experiencing larger classes; and how ICT can help mitigate the challenges. The following recommendations are given, based on the findings from this study.

7.4.1 For educators and curriculum developers

First, educators will have to realise that the increase in intake of design students is not going to diminish, when viewing the agenda pursued by governments of developing countries. And with limited resources available, infrastructure is unlikely

to be on par any time soon. Educators will have to start collaborating with other design institutions for ICT use. This will mean creating links with students engaging with other students abroad on common projects. Results from such projects will give the needed confidence to educators to apply ICT boldly in their own way.

Educators will have to shun the idea that students are actually following the traditional pedagogy of graphic design to the letter. They should rather open up to discussions with students on innovations that will help realise students' abilities to integrate ICT, especially with ideation, which will indicate the level of their knowledge as far as ICT and ideation are concerned. Consequently, students will be clear and 'truthful' in their use of ICT during critiques and presentations, as required by the pedagogy of graphic design.

Finally, and most importantly, educators should not restrict the use of technology in graphic design to only the execution of final works as some of them are currently doing, but rather encourage all aspects of the process, including ideation, a very integral part of the process of graphic design. Most importantly, educators will have to take another look at the pedagogy of graphic design as it relates to ideation. They will have to embrace innovation education that will facilitate specific projects using Virtual Reality Learning Environment (VRLE) technology (Thorsteinsson et al., 2010).

7.4.2 For policy and practice

The nature of the profession today is such that one needs to always 'invent' some avenue to meet the challenges of its fast-paced transformation. According to Kowaltowski et al. (2010:454), recent job market trends and the globalisation of the design profession calls for higher design quality from design professionals.

The contemporary world with its dynamic production of knowledge and speed in technological advances, as well as obsolescence, demands professionals capable of keeping up with this pace ... The new order also implies that design students need a deeper understanding of background knowledge and need to acquire new abilities and attitudes towards design, with an increased demand on creativity. Producing designs that are fresh and new to the problem domain are expected of our students and of design professionals as a whole.

New abilities will require that graphic design students get the requisite skills and knowledge that will make them more competitive in the job market. Interviews with students revealed that their proficiency in the use of ICT would help them to become competitive in the job market. Students should therefore be encouraged to learn and use available technology and software that will give them the leading edge in developing ideas for the design process. Educators will therefore have to take a positive look at this situation and develop a strategic plan for the integration of ICT into academic programmes as part of the teaching and learning function.

7.4.3 For further research

Having mentioned recommendations, it is proper to indicate that this study was not without limitations. One major limitation that could be carried along for further research is the issue of ideation's typical overlaps and dependence on sufficient interpreting of design briefs, which are not taken into account. This leads to theoretical and argumentation problems when arguing a case for the important rule of ICT in current design education environments. This problem was not captured fully in this study and therefore this study proposes further research into how important ICT should be within the activity of ideation in the world of graphic design education.

This study reveals some positive and better correlation between the use of ICT and the creative output of students. Given the technological environment with developmental and productivity tools for the software for graphic design, the possibilities of discovering something new by students are very likely. This current study agrees with Yeoh (2002:225) that,

'the computer is more than a medium because if it stimulates the mind, it may enhance our creativity. We need technology to make things easier for us but at the same time we also need creativity to be different and to excel, despite the content, context, and objectives of the problem we are trying to solve.'

This study proposes further research into how ICT is enhancing creativity within the activity of ideation in the world of graphic design education.

7.5 A final word

Lecturers and students, who opened up to me during this study, did so voluntarily and were keen to share their opinions and experiences with me. Some of the

lecturers invited me into their lecture rooms to explore how students used ICT during their ideation programmes. I believe they did so because they had some perception of what seems to be happening with ICT and idea development, even though they did not appreciate the real issues. They were enthusiastic about what they were doing, and ready to sacrifice some of their busy schedules for me, because they were eager to know what pertains in the field of graphic design with ICT, especially within ideation.

Educators who open their lecture rooms to outsiders like me need to be commended. And I believe there are more out there who are keen to understand and establish the synergy between ICT and graphic design, especially with ideation. I owe it to them to interrogate these findings. I hope they can make use of the discussions and make a difference to education in developing countries, including Ghana and South Africa. I hope this study is cognisant of these nuances and in some way makes a difference in graphic design pedagogy, with regard to the emerging economies. Furthermore, this study encourages educators to develop an appropriate innovation education in the pedagogy being used, and thereby create appropriate methods of ICT for the teaching and learning processes of ideation in graphic design in emerging economies.

References

- ❖ Appiah, E. & Cronjé, J.C. 2012. Thumbnail sketches on idea development: the drawing board vs computer generation. *Art, Design & Communication in Higher Education*, 11(1): 49-61.
- ❖ Appiah, E. & Cronjé, J.C. 2013a. Exploring information and communication theory in graphic design education with activity theory. *International Journal of Computer Applications*, 84(12): 15-22, December.
- ❖ Appiah, E. & Cronjé, J.C. 2013b. Information communication and technology (ICT) and the challenges of ideation in graphic design: an activity theory focus. *International Journal of Computer Applications*, 63(6): 13-23, February.
- ❖ Atherton, J.S. 2011. Learning and teaching: behaviourism. <http://www.learningandteaching.info/learning/behaviour.htm> [21 August 2011].
- ❖ Babbie, E.R. & Mouton, J. 2001. *The practice of social research*. Cape Town: Oxford University Press.

- ❖ Batta, C.E. 2009. The business of being creative: the professionalization of graphic design in Lancaster, PA. Unpublished undergraduate honours thesis, Franklin & Marshall College, Lancaster, PA.
- ❖ Bell, J. 2005. *Doing your research project: a guide for first-time researchers in education, health and social sciences*. 4th ed. Maidenhead: Open University Press.
- ❖ Bender, D.M. 2005. Developing a collaborative multidisciplinary online design course. *Journal of Educators Online*, 2(2):1-12, July.
- ❖ Bender, D.M. & Vredevoogd, J.D. 2006. Using online education technologies to support studio instruction. *Educational Technology & Society*, 9(4):114-122.
- ❖ Bennett, R. 2000. The Omnium Project: proposing a framework for creative online interaction.
http://www.omnium.net.au/assets/downloads/papers/2003_createEd_omnium.pdf [19 May 2014].
- ❖ Bhattacharjee, A. 2012. *Social science research: principles, methods and practices*. 2nd ed. Tampa, FL: A. Bhattacharjee.
- ❖ Bilda, Z., Gero, J.S. & Purcell, T. 2006. To sketch or not to sketch? That is the question. *Design Studies*, 27(5):587-613, September.
- ❖ Bottino, R-M., Chiappini, G., Forcheri, P., Lemut, E. & Molfino, M-T. 1999. Activity theory: a framework for design and reporting on research projects based on ICT. *Education and Information Technologies*, 4(3):281-295.
- ❖ Broadfoot, O. & Bennett, R. 2003. Design studios: online? Comparing traditional face-to-face design studio education with modern internet-based design studios. In *Apple University Consortium Academic and Developers Conference Proceedings, Adelaide, South Australia, 28 September–1 October 2003*. Wollongong: Apple University Consortium Academic and Developers Conference: 1-13.
- ❖ Brown, S. & Cruickshank, I. 2003. The virtual studio. *International Journal of Art & Design Education*, 22(3): 281-288, October.
- ❖ Brown, T. 2008. Design thinking. *Harvard Business Review*, 86(6):84-92, 141, June.
- ❖ Brown, T.H. 2005. Beyond constructivism: exploring future learning paradigms. *Education Today*, (2):1-11.

- ❖ Brown, T.H. 2006. Beyond constructivism: navigationism in the knowledge era. *On the Horizon*, 14(3):108-120.
- ❖ Chai, K-H. & Xiao, X. 2012. Understanding design research: a bibliometric analysis of *Design Studies* (1996–2010). *Design Studies*, 33(1):24-43, January.
- ❖ Collins, A., Joseph, D. & Bielaczyc, K. 2004. Design research: theoretical and methodological studies. *Journal of the Learning Sciences*, 13(1):15-42.
- ❖ Creswell, J.W. 2003. *Research design: qualitative, quantitative and mixed method approaches*. 2nd ed. Thousand Oaks, CA: Sage.
- ❖ Creswell, J.W. 2007. *Qualitative inquiry and research design: choosing among five approaches*. 2nd ed. Thousand Oaks, CA: Sage.
- ❖ Cronjé, J. 2006. Paradigms regained: towards integrating objectivism and constructivism in instructional design and the learning sciences. *Educational Technology Research and Development*, 54(4):387-416, August.
- ❖ Cross, N., 2001a. Can a Machine Design? *Design Issues*, 17(4), pp.44–50. Available at:
<http://www.mitpressjournals.org/doi/abs/10.1162/07479360152681083>.
- ❖ Cross, N. 1997. Creativity in design: analyzing and modeling the creative leap. *Leonardo*, 30(4):311-317.
- ❖ Cross, N. 1999. Design research: a disciplined conversation. *Design Issues*, 15(2):5-10, Summer.
- ❖ Cross, N. 2001b. Designerly ways of knowing: design discipline versus science. *Design Issues*, 17(3):49-55, Summer.
- ❖ Cross, N. & Cross, A.C. 1995. Observations of teamwork and social processes in design. *Design Studies*, 16(2):143-170, April.
- ❖ Crowe, B.A. 1988. Computers in the secondary school art curriculum: painting a picture of effective teaching. Paper presented at the Annual Meeting of the Mid-South Educational Research Association, Louisville, KY, 9–11 November.
- ❖ Dale, J.S. 2006. A technology-based online design curriculum. In Ho, C.P. (ed.). *Proceedings of the 11th Annual Technology, College & Community Online World Conference (TCC)*, 18–20 April. Hawaii: University of Hawaii: 2-11.
- ❖ Davis, M. 2008. Why do we need doctoral study in design? *International Journal of Design*, 2(3):71-79.

- ❖ Denscombe, M. 2007. *The good research guide: for small-scale social research projects*. 3rd ed. Buckingham: Open University Press.
- ❖ Dewey, J. 1934. *Art as experience*. New York: Perigee Books.
- ❖ Dorst, K. 2006. Design problems and design paradoxes. *Design Issues*, 22(3):4-17, Summer.
- ❖ Dorst, K. & Cross, N. 2001. Creativity in the design process: co-evolution of problem – solution. *Design Studies*, 22(5):425-437, September.
- ❖ Duffy, T.M. & Cunningham, D.J. 1996. Constructivism: implications for the design and delivery of instruction. In Jonassen D.H. (ed.). *Handbook of research for educational communications and technology*. New York: Macmillan: 170-198.
- ❖ Dutton, T.A. 1987. Design and studio pedagogy. *Journal of Architectural Education*, 41(1):16-25, Autumn.
- ❖ Eckert, C.M., Blackwell, A.F., Bucciarelli, L.L. & Earl, C.F. 2010. Shared conversations across design. *Design Issues*, 26(3):27-39, Summer.
- ❖ Ehmann, D. 2005. Using assessment to engage graphic design students in their learning experience. Paper presented at the 2005 Evaluations and Assessment Conference: Making a Difference, Sydney, Australia, 30 November–1 December: 107-113.
- ❖ Ellmers, G. 2006. Reflection and graphic design pedagogy: developing a reflective framework to enhance learning in a graphic design tertiary environment. *Proceedings of the 2006 Australian Council of University Art and Design Schools (ACUADS) Conference: Thinking the Future: Art, Design and Creativity, Melbourne, Victoria, 27–29 September*. 10pp.
- ❖ Ellmers, G., Foley, M. & Bennett, S. 2008. Graphic design education: a revised assessment approach to encourage deep learning. *Journal of University Teaching & Learning Practice*, 5(1):77-87. <http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1063&context=jutlp> [20 May 2014].
- ❖ Engeström, Y. 1987. *Learning by expanding: an activity theoretical approach to developmental research*. Helsinki: Orienta-Konsultit Oy.
- ❖ Engeström, Y. 1999a. Activity theory and individual and social transformation. In Engeström, Y., Miettinen, R. & Punamäki, R-L. (eds). *Perspectives on activity theory*. Cambridge: Cambridge University Press: 19-38.

- ❖ Engeström, Y. 1999b. Expansive visibilization of work: an activity-theoretical perspective. *Computer Supported Cooperative Work*, 8:63-93.
- ❖ Engeström, Y., Miettinen, R. & Punamäki, R-L. (eds). 1999. *Perspectives on activity theory*. Cambridge: Cambridge University Press.
- ❖ Engholm, I. 2011. Design theory: positions in contemporary design research – an attempt at categorisation. In Appiah, E., Mlitwa, N. & Anyomi, D. (eds). *Proceedings of Design, Development and Research (DDR) 2011: Annual Research Conference of the Faculty of Informatics and Design, Cape Town, 26–27 September*. Cape Town: Cape Peninsula University of Technology: 1-21.
- ❖ Finlay, L. 2009. Debating phenomenological research methods. *Phenomenology & Practice*, 3(1):6-25.
- ❖ Fraenkel, J.R. & Wallen, N.E. 2003. *How to design and evaluate research in education*. 5th ed. Boston, MA: McGraw-Hill Higher Education.
- ❖ Franciscono, M. 1971. *Walter Gropius and the creation of the Bauhaus in Weimer: ideals and artistic theories of its founding fathers*. Urbana, IL: University of Illinois Press.
- ❖ Garner, S. 2000. Is sketching still relevant in virtual design studios? In Kiang, T.B., Tan, M., & Chii, W.Y. (eds). *Proceedings of the Fifth Conference on Computer-Aided Architectural Design Research in Asia (CAADRIA), Singapore*. Singapore: Centre for Advanced Studies in Architecture. <http://cuminacad.architexturez.net/system/files/pdf/1eac.content.pdf> [23 May 2014].
- ❖ Given, L.M. (ed.). 2008. *The SAGE encyclopedia of qualitative research methods*. Los Angeles, CA: Sage.
- ❖ Gorard, S. & Taylor, C. 2004. *Combining methods in educational and social research*. Maidenhead: Open University Press.
- ❖ Graham, E.M. 2003. Studio design critique: student and faculty expectations and reality. Unpublished Master of Landscape Architecture thesis, Louisiana State University, Baton Rouge, LA.
- ❖ Gravetter, F.J. & Forzano, L-A. B. 2009. *Research methods for behavioral sciences*. 3rd ed. Belmont, CA: Wadsworth Cengage Learning.
- ❖ Gray, D.E. 2004. *Doing research in the real world*. London: Sage.

- ❖ Hasirci, D. & Demirkan, H. 2007. Understanding the effects of cognition in creative decision making: a creativity model for enhancing the design studio process. *Creativity Research Journal*, 19(2-3):259-271.
- ❖ Henning, E., Van Rensburg, W. & Smit, B. 2004. *Finding your way in qualitative research*. Pretoria: Van Schaik.
- ❖ Herrington, A., Herrington, J. & Mantei, J. 2009. Design principles for mobile learning. In Herrington, J., Herrington, A., Mantei, J., Olney, I.W. & Ferris, B. (eds). *New technologies, new pedagogies: mobile learning in higher education*. Wollongong: Faculty of Education, University of Wollongong: 129-138.
- ❖ <http://ro.uow.edu.au/newtech/> [20 May 2014].
- ❖ Higgins, S. 2008. Does ICT improve learning and teaching in schools? Newcastle: British Educational Research Association. <http://www.bera.ac.uk/wp-content/uploads/2014/01/ict-pur-mb-r-f-p-1aug03.pdf> [20 May 2014].
- ❖ Ho, A.G. 2010. Outcomes-based teaching and learning in design education: new approach to enhance students learning for better design outcomes. In Forsyth, G. (ed.). *Proceedings of ConnectED 2010 – 2nd International Conference on Design Education, Sydney, Australia, 28 June–1 July*. Sydney: University of New South Wales: 5pp.
- ❖ Hodge, S. 2009. Drawing. <http://psd.tutsplus.com> [20 April 2009].
- ❖ Issroff, K. & Scanlon, E. 2002. Using technology in higher education: an activity theory perspective. *Journal of Computer Assisted Learning*, 18(1):77-83.
- ❖ Ivankova, N.V., Creswell, J.W. & Plano-Clark, V.L. 2007. Foundations and approaches to mixed methods research. In Maree, K. (ed.). *First steps in research*. Pretoria: Van Schaik: 256-284.
- ❖ Jaffer, S., Ng'ambi, D. & Czerniewicz, L. 2007. The role of ICTs in higher education in South Africa: one strategy for addressing teaching and learning challenges. *International Journal of Education and Development Using Information and Communication Technology*, 3(4):131-142.
- ❖ Johnson, R.B. & Onwuegbuzie, A.J. 2004. Mixed methods research: a research paradigm whose time has come. *Educational Researcher*, 33(7):14-26.
- ❖ Jonassen, D.H. 1991. Objectivism versus constructivism: do we need a new philosophical paradigm? *Educational Technology Research & Development*, 39(3):5-14.

- ❖ Jonassen, D.H. & Rohrer-Murphy, L. 1999. Activity theory as a framework for designing constructivist learning environments. *Educational Technology Research & Development*, 47(1):61-79.
- ❖ Jonson, B. 2004. Design ideation: the conceptual sketch in a digital design culture. Unpublished PhD thesis, Goldsmiths, University of London.
- ❖ Jonson, B. 2005. Design ideation: the conceptual sketch in the digital age. *Design Studies*, 26(6):613-624, November.
- ❖ Kain, D. & Wardle, E. 2004. Activity theory: an introduction for the writing classroom. <http://core.ecu.edu/engl/kaind/3880/projects/AT.pdf> [20 May 2014].
- ❖ Kaptelinin, V. & Nardi, B.A. 2006. *Acting with technology: activity theory and interaction design*. Cambridge, MA: MIT Press.
- ❖ Kimbell, R. 2004. Ideas and ideation. *Journal of Design and Technology Education*, 9(3):136-137.
- ❖ Kolarevic, B., Schmitt, G., Hirschberg, U., Kurmann, D. & Johnson, B. 1998. Virtual design studio: multiplying time. *Design*, 3(1):2-9.
- ❖ Kolb, A.Y & Kolb, D.A. 2005. Learning styles and learning spaces: enhancing experiential learning in higher education. *Academy of Management Learning & Education*, 4(2):193-212, June.
- ❖ Korpela, K. & Mursu, A. Means for cooperative work and activity networks: an analytical framework. In Kuutti, K. et al. (eds). *ECSCW 2003: Proceedings of the Eighth European Conference on Computer-Supported Cooperative Work, Helsinki, Finland, 14–18 September*. Dordrecht: Kluwer Academic.
- ❖ Koskinen, I.K., Zimmerman, J., Binder, T., Redström, J. & Wensveen, S. 2011. *Design research through practice: from the lab, field, and showroom*. Waltham, MA: Morgan Kaufmann.
- ❖ Kowaltowski, D.C.C.K., Bianchi, G. & De Paiva, V.T. 2010. Methods that may stimulate creativity and their use in architectural design education. *International Journal of Technical Design Education*, 20:453-476.
- ❖ Kruger, C. & Cross, N. 2006. Solution driven versus problem driver design: strategies and outcomes. *Design Studies*, 27(5):527-548, September.
- ❖ Kuutti, K. 1996. Activity theory as a potential framework for human – computer interaction research. In Nardi, B.A. (ed.). *Context and consciousness: activity theory and human – computer interaction*. Cambridge, MA: MIT Press: 17-44.

- ❖ Kvan, T. 2001. The pedagogy of virtual design studios. *Automation in Construction*, 10:345-353.
- ❖ Lilien, G.L., Morrison, P.D., Searls, K., Sonnack, M. & Von Hippel, E. 2002. Performance assessment of the lead user idea-generation process for new product development. *Management Science*, 48(8):1042-1059.
- ❖ Lim, C.P. & Hung, W.L. 2003. An activity theory approach to research of ICT integration in Singapore schools. *Computers & Education*, 41(1):49-63.
- ❖ Lim, K. & Lee, D.Y. 2008. A comprehensive approach to the teacher's role in computer supported learning environments. In McFerrin, K. et al. (eds). *Proceedings of the Society for Information Technology & Teacher Education International Conference (SITE) 2008, Las Vegas, NE, 3–7 March*. Chesapeake, VA: AACE: 4208-4213.
- ❖ Liu, S. & Bolton, S. 2011. Improving the role and use of idea generation in developing consumer value with NPD activities. Paper presented at the International Design Alliance (IDA) Education Congress: Design at the Edges, Taipei, Taiwan, 24–26 October. 6pp.
- ❖ Logan, C. 2007. Metaphor and pedagogy in the design practicum. *International Journal of Technology and Design Education*, 18(1):1-17.
- ❖ Long, S. 2001. Multimedia in the art curriculum: crossing boundaries. *Journal of Art & Design Education*, 20(3):255-263, October.
- ❖ Long, S. 2005. What effect will digital technologies have on visual education in schools? In Loveless, A. & Ellis, V. (eds). *ICT, pedagogy, and the curriculum: subject to change*. London: RoutledgeFarmer: 199-244.
- ❖ Lovett, S. 2010. Print is out/Print is in: printmaking and design education. In Forsyth, G. (ed.). *Proceedings of ConnectED 2010 – 2nd International Conference on Design Education, Sydney, Australia, 28 June–1 July*. Sydney: University of New South Wales: 5pp.
- ❖ Lowerison, G., Sclater, J., Schmid, R.F. & Abrami, P.C. 2006. Student perceived effectiveness of computer technology use in post-secondary classrooms. *Computers & Education*, 47:465-489, April.
- ❖ Malecha, M.J., 1985. *The Design Studio*, La Viena, CA: Architecture and Research Press.

- ❖ Mangan, J., Lalwani, C. & Gardner, B. 2004. Combining quantitative and qualitative methodologies in logistics research. *International Journal of Physical Distribution & Logistics Management*, 34(7):565-578.
- ❖ Maree, K. & Van der Westhuizen, C. 2007. Planning a research proposal. In Maree, K. (ed.). *First steps in research*. Pretoria: Van Schaik: 23-45.
- ❖ Margolin, V. 2007. Design for development: towards a history. *Design Studies*, 28(2):111-115, March.
- ❖ Mayo, W.P., Donnelly, M.B. & Schwartz, R.W. 1995. Characteristics of the ideal problem-based learning tutor in clinical medicine. *Evaluation & the Health Professions*, 18(2):124-136.
- ❖ McCormick, R. 2004. Collaboration: the challenge of ICT. *International Journal of Technology and Design Education*, 14:159-176.
- ❖ McLoughlin, C. & Lee, M.J.W. 2008. Mapping the digital terrain: new media and social software as catalysts for pedagogical change. In *Hello! Where are you in the landscape of educational technology? Proceedings Ascilite Melbourne 2008*: 641-652.
<http://www.ascilite.org.au/conferences/melbourne08/procs/mcloughlin.html> [20 May 2014].
- ❖ McQuiston, L. 1993. *Graphic agitation: social and political graphics since the sixties*. London: Phaidon.
- ❖ Meggs, P.B. & Purvis, A.W. 2012. *Meggs' history of graphic design*. 5th ed. Hoboken, NJ: John Wiley.
- ❖ Mioduser, D. & Dagan, O. 2007. The effect of alternative approaches to design instruction (structural or functional) on students' mental models of technological design processes. *International Journal of Technology and Design Education*, 17:135-148.
- ❖ Mlitwa, N. & Van Belle, J-P. 2010. A proposed interpretivist framework to research the adoption of learning management systems in universities. *Communications of the IBIMA*: 1-11. Article ID 574872.
- ❖ Nardi, B.A. 1996. *Context and consciousness: activity theory and human – computer interaction*. Cambridge, MA: MIT Press.
- ❖ Nelson, R. 2009. *The jealousy of ideas: research methods in the creative arts*. London: Writing Pad.

- ❖ Neuman, W.L. 2007. *Basics of social research: qualitative and quantitative approaches*. 2nd ed. Boston, MA: Pearson/Allyn & Bacon.
- ❖ Nieuwenhuis, J. 2007a. Introducing qualitative research. In Maree, K. (ed.). *First steps in research*. Pretoria: Van Schaik: 46-68.
- ❖ Nieuwenhuis, J. 2007b. Qualitative research designs and data gathering techniques. In Maree, K. (ed.). *First steps in research*. Pretoria: Van Schaik: 69-96.
- ❖ Onwuegbuzie, A.J. & Johnson, R.B. 2006. The validity issue in mixed research. *Research in the Schools*, 13(1):48-63.
- ❖ Osborn, A.F. 1991. *Your creative power: how to use imagination to brighten life, to get ahead*. Schaumburg, IL: Motorola University Press.
- ❖ Öztürk, M.N. & Türkan, E.E. 2006. The design studio as teaching/learning medium – a process-based approach. *International Journal of Art & Design*, 25(1):96-104, February.
- ❖ Page, T., Lehtonen, M., Thorsteinsson, G., Yokoyama, E. & Ruokamo, H. 2005. A virtual learning environment in support of blended and distance learning in technology and design education. *Bulletin of Institute of Technology and Vocational Education (Graduate School of Education and Human Development, Nagoya University, Japan)*, 2(1):10-20.
- ❖ Page, T., Thorsteinsson, G. & Niculescu, A. 2009. Management of knowledge in a problem based learning environment. *Journal of Studies in Informatics and Control*, 18(3):225-262.
- ❖ Papert, S., 1987. Computer criticism vs technocentric thinking. *Educational Researcher*, 16(1), pp.22–30.
- ❖ Phelps, R. & Maddison, C. 2008. ICT in the secondary visual arts classroom: a study of teachers' values, attitudes and beliefs. *Australasian Journal of Educational Technology*, 24(1):1-14.
- ❖ Phillips, R. & Gilding, T. 1998. Approaches to evaluating the effect of ICT on student learning. ALT and LTSN Generic Centre e-Learning Starter Guides (Murdoch University Research Repository).
- ❖ Radclyffe-Thomas, N. 2008. White heat or blue screen? Digital technology in art & design education. *International Journal of Art & Design Education*, 27(2):158-167, June.

- ❖ Ranjan, M.P. 2005. Creating the unknowable: designing the future in education. Paper prepared for the EADO 6 Conference, Bremen, German, 29–31 March.
- ❖ Reffat, R. 2007. Revitalizing architectural design studio teaching using ICT: reflections on practical implementations. *International Journal of Education and Development Using Information and Communication Technology*, 3(1):39-53.
- ❖ Reffat, R.M. 2002. Designing with computers in a paperless design computing studio. In *CAADRIA 2002: Proceedings of the 7th International Conference on Computer Aided Architectural Design Research in Asia, Cyberjaya, Malaysia, 18–20 April*: 347-354.
- ❖ Reffat, R.M. 2008. Planning for effective utilization of information technology in architectural design education. In *Proceedings of 2nd Conference on Planning & Development of Education and Scientific Research in the Arab States, Dhahran, Saudi Arabia, 24–27 February*. Vol. 2: 897-907.
- ❖ Resnick, E. 2003. *Design for communication: conceptual graphic design basics*. Hoboken, NJ: John Wiley.
- ❖ Richey, R.C. 1998. The pursuit of useable knowledge in instructional technology. *Educational Technology Research and Development*, 46(4):7-22.
- ❖ Saghafi, M.R., Franz, J.M. & Crowther, P. 2010. Crossing the cultural divide: a contemporary holistic framework for conceptualising design studio education. In Forsyth, G. (ed.). *Proceedings of ConnectED 2010 – 2nd International Conference on Design Education, Sydney, Australia, 28 June–1 July*. Sydney: University of New South Wales: 4pp.
- ❖ Sagun, A., Demirkan, H. & Goktepe, M. 2001. A framework for the design studio in web-based education. *Journal of Art & Design Education*, 20(3):332-342, October.
- ❖ Schenk, P. 1991. The role of drawing in the graphic design process. *Design Studies*, 12(3):168-181, July.
- ❖ Schenk, P. 2005. Before and after the computer: the role of drawing in graphic design. *Research Journal of the Australian Graphic Design Association*, 1(2):11-20.
- ❖ Schenk, P. 2007. Developing a taxonomy on drawing for design. In Poggenpohl, S. (ed.). *Proceedings of the International Association of Societies of Design Research (IASDR 07), Hong Kong, 12–15 November*. Hong Kong: Hong Kong Polytechnic University: 1-15.

- ❖ Schnabel, M.A. & Kvan, T. 2001. Implementing the first virtual environment design studio. In Tan, M. (ed.). *Architectural Education for the Asian Century: Proceedings of the 1st ACAE Conference on Architectural Education, Singapore, 7 September*. Singapore: Centre for Advanced Studies in Architecture, National University of Singapore: 157-166.
- ❖ Schon, D.A. 1998. *Educating the reflective practitioner*. San Francisco, CA: Jossey-Bass.
- ❖ Sekaran, U. 2003. *Research methods for business: a skill-building approach*. 4th ed. New York: John Wiley.
- ❖ Sintusingha, S. & Wu, H. 2010. Studio teaching for the property discipline. *Proceedings of the 17th Annual Real Estate Society Conference, Milan, Italy, 23–26 June*: 1-16.
- ❖ Spendlove, D. & Hopper, M. 2004. Creativity in design and technology and ICT: imagining possibilities in a digital age. In Norman, E.W.L. Spendlove, D., Grover, P. & Mitchell, A. (eds). *DATA International Research Conference on Creativity and Innovation 2004. Sine loco*: Data: 173-178.
- ❖ Stensaker, B., Maassen, P., Borgen, M., Oftebro, M. & Karseth, B. 2007. Use, updating and integration of ICT in higher education: linking purpose, people and pedagogy. *Higher Education*, 54:417-433.
- ❖ Stones, C. & Cassidy, T. 2007. Comparing synthesis strategies of novice graphic designers using digital and traditional methods. *Design Studies*, 28(1):59-72, January.
- ❖ Stones, C. & Cassidy, T. 2010. Seeing and discovering: how do student designers reinterpret sketches and digital marks during graphic design ideation? *Design Studies*, 31(5):439-460, September.
- ❖ Sullivan, G. 2010. *Art practice as research: inquiry in visual arts*. 2nd ed. Thousand Oaks, CA: Sage.
- ❖ Swanson, G. 1994. Graphic design education as a liberal art: design and knowledge in the university and the “real world”. *Design Issues*, 10(1):53-63, Spring.
- ❖ Swanson, G. 1998. Graphic design education as a liberal art: design and knowledge in the university and the “real world”. In Heller, S. (ed.). *The education of a graphic designer*. New York: Allworth: 13-24.

- ❖ Tan, S. & Melles, G. 2010. An activity theory focused case study of graphic designers' tool-mediated activities during the conceptual design phase. *Design Studies*, 31(5):461-478, September.
- ❖ Tang, H.H., Lee, Y.Y. & Gero, J.S., 2011. Comparing collaborative co-located and distributed design processes in digital and traditional sketching environments: A protocol study using the function-behaviour-structure coding scheme. *Design Studies*, 32(1), pp.1-29. Available at: <http://linkinghub.elsevier.com/retrieve/pii/S0142694X10000475> [Accessed August 13, 2012].
- ❖ Teddlie, C. & Tashakkori, A. 2009. *Foundations of mixed methods research: integrating quantitative and qualitative activities during the conceptual design stage*. Thousand Oaks, CA: Sage.
- ❖ Thompson, C. 2010. Education and/or displacement? A pedagogical inquiry into Foucault's 'limit-experience'. *Educational Philosophy and Theory*, 42(3):361-377, April.
- ❖ Thorsteinsson, G., Page, T. & Niculescu, A. 2010. Adoption of ICT in supporting ideation skills in conventional classroom settings. *Informatics and Control*, 19(3):309-318.
- ❖ Tinio, V.L. 2003. *ICT in education*. New York: UN Development Programme.
- ❖ Tolman, C.W. 1999. Society versus context in individual development: does theory make a difference? In Engeström, Y., Miettinen, R. & Punamäki, R-L. (eds). *Perspectives on activity theory*. Cambridge: Cambridge University Press: 70-86.
- ❖ Uluoğlu, B. 2000. Design knowledge communicated in studio critiques. *Design Studies*, 21(1):33-58, January.
- ❖ Ungerleider, C.S. & Burns, T.C. 2002. Information and communication technologies in elementary and secondary education: a state of the art review. Paper prepared for the 2002 Pan-Canadian Education Research Agenda Symposium: Information Technology and Learning, Montreal, Canada, 30 April-2 May.
- ❖ Viganò, R. & Carulli, M. 2009. Methods and tools for supporting industrial design innovation. In *Undisciplined! Proceedings of the 4th Biennial Design Research Society Conference 2008, Sheffield, UK, 16-19 July 2008*: 374-395.
- ❖ Vygotsky, L.S. 1978. *Mind in society: the development of higher psychological processes*. Cambridge, MA: Harvard University Press.

- ❖ Wahab, I.A. 2010. A study on the elements of graphic design in the success of visual communication. Unpublished MA thesis, Universiti Teknologi Mara, Shah Alam, Malaysia.
- ❖ Wallas, G. 1926. *The art of thought*. New York: Harcourt Brace Jovanovich.
- ❖ Wallis, L., Williams, T. & Ostwald, M. 2010. The 'studio' conundrum: making sense of the Australasian experience in architectural education. In Forsyth, G. (ed.). *Proceedings of ConnectED 2010 – 2nd International Conference on Design Education, Sydney, Australia, 28 June–1 July*. Sydney: University of New South Wales: 5pp.
- ❖ Wang, F., & Hannafin, M. J. (2005). Design-based research and technology-enhanced learning environments. *Educational Technology Research and Development*, 53(4), 5-23
- ❖ Wang, T. 2009. The transformational promise of information and communications technologies (ICTs) for the professional education of architects. *Educational Technology & Society*, 12(3):206-213.
- ❖ Wang, T. 2010. A new paradigm for design studio education. *International Journal of Art & Design Education*, 29(2):173-183, June.
- ❖ Wang, T. 2011. Designing for designing: information and communication technologies (ICTs) and professional education. *International Journal of Art & Design Education*, 30(2):188-199, June.
- ❖ Ward, A. 1990. Ideology, culture and the design studio. *Design Studies*, 11(1):10-16, January.
- ❖ Webometrics. 2011. Ranking web of universities: Africa. <http://www.webometrics.info/en/Africa> [17 September 2012].
- ❖ Wenger, E. 2006. Communities of practice: a brief introduction. <http://www.learningtolearn.sa.edu.au/tfel/> [12 July 2012].
- ❖ Whitford, F. 1984. *Bauhaus*. London: Thames and Hudson.
- ❖ Wilson-Strydom, M., Thomson, J. & Hodgkinson-Williams, C. Understanding ICT integration in South African classrooms. *Perspectives in Education*, 23(4):71-85, December.
- ❖ Wozencroft, J. 1994. *The graphic language of Neville Brody*. London: Thames and Hudson.

- ❖ Yeoh, K.C. 2002. A study on the influences of computer usage on idea formation in graphic design students. Unpublished PhD dissertation, Texas Tech University, Lubbock, TX.
- ❖ Yeoh, K.C. 2006. Recommendations for design educators and students who embrace computer technology. *International Journal of the Arts in Society*, 1:167-182.
- ❖ Yin, R.K. 2009. *Case study research: design and methods*. 4th ed. Los Angeles, CA: Sage.
- ❖ Yin, R.K. 2011. *Qualitative research from start to finish*. New York: Guilford Press.
- ❖ Zhang, J. 2007. A cultural look at information and communication technologies in Eastern education. *Educational Technology Research and Development*, 55(3):301-314, June.

APPENDICES

APPENDIX A: QUESTIONNAIRE FOR DESIGN LECTURERS



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QUESTIONNAIRE FOR DESIGN LECTURERS

As part of my doctoral studies in ICT in graphic design education, I will like you to help fill this questionnaire. The questionnaire seeks to explore the possibilities of ICT as a mediation tool in the teaching of IDEATION in graphic design within a developing country. This in a way is to enhance graphic design education in the wake of ICT.

This study's findings will hopefully assist graphic design educators to evolve an ICT framework that will fit the realities in the current system, help facilitate better ICT integration and possibly online design education in a public university in a developing country. The emerging strategy would ideally be adjustable and context-responsive to allow for application in similar design-related areas.

It is vital all your answers are accurate and honest. Your answers to this questionnaire will not be disseminated further. While the result of these study presumptions will be published, I vouch for the higher level of confidentiality and privacy about all information given, including your names, faculties and personnel.

Please complete all questions. For questions or comments about this questionnaire, or if you require information about the study, please feel free to contact or e-mail me at:

Cell: (+27) 73-609-7480

E-mail: appiahe@cput.ac.za or eddappiah@gmail.com

Thank you all for being willing to complete this questionnaire. I look forward to publishing and sharing the anonymous outcomes of this study with our African community.

Please understand that participating in this survey is voluntary and any one may withdraw at any time.

Edward Appiah
Researcher

SECTION (1): ACCESS TO ICTs AND THE INTERNET

- ❖ Please answer the questions by putting (✓) in a relevant square (☐) or by writing your answer in a space provided.
- ❖ *ICTs (Information and Communication Technologies) refer to computers, computer infrastructure and any associated technologies, including software, hardware, and Internet connectivity.

1. On average, how often do you go to the campus during the semester for lectures?

Never	Monthly	Weekly	Daily
☐	☐	☐	☐

2. Where do you access the Internet? (You may indicate MORE THAN ONE answer)

On-campus	At home	Internet café	On my cellphone
☐	☐	☐	☐
Other ☐ please specify:			

3. Where do you use the Internet on campus? (You may indicate MORE THAN ONE answer)

Office	Computer laboratory	Library	Lecture room
☐	☐	☐	☐
Other ☐ please specify:			

4. How easy/difficult is it for you to access Internet on campus?

Very difficult	Difficult	Easy	Very easy
☐	☐	☐	☐

5. Where do you access the Internet off-campus? (You may indicate MORE THAN ONE answer)

My home	Internet Cafe	Library	On my cellphone
☐	☐	☐	☐
Other ☐ please specify:			

6. How easy/difficult is it for you to access Internet off-campus?

Very difficult	Difficult	Easy	Very easy
☐	☐	☐	☐

7. Which of the following devices do you have? Is it connected to the Internet?

	Desktop PC		Laptop		Cellphone		Personal digital assistant (PDA)	
Availability	☐		☐		☐		☐	
Internet connectivity	Yes ☐	No ☐	Yes ☐	No ☐	Yes ☐	No ☐	Yes ☐	No ☐
Other ☐ please specify:								

8. Which of the following devices do you own?

Desktop PC		Laptop		Cellphone		Personal digital assistant (PDA)	
Yes ☐	No ☐	Yes ☐	No ☐	Yes ☐	No ☐	Yes ☐	No ☐
Others (please specify)							

9. How often do you use the devices in Q7 for academic purposes?

	All the time	Most of the time	Some of the time	Seldom	Never
Desktop PC	☐	☐	☐	☐	☐
Laptop	☐	☐	☐	☐	☐
Cellphone	☐	☐	☐	☐	☐
Personal Digital Assistant (PDA)	☐	☐	☐	☐	☐
Others (please specify)	☐	☐	☐	☐	☐

10. Please can you estimate how many hours per day you engaged with ICT for academic purpose?

1-3 ☐	4-5 ☐	6-8 ☐	9-10 ☐	11-15 ☐
---------------------------------	---------------------------------	---------------------------------	----------------------------------	-----------------------------------

11. How often do you allow the use of ICT* by students in your teaching?

All the time	Most of the time	Some of the time	Seldom	Never
☐	☐	☐	☐	☐

12. What type of ICTs are students allowed to use in their academic exercises and for what purpose? (* Please indicate others, including particular software in 5 – 8)

NO	Activities	Research	Final work	Brainstorming for ideas	Collaboration among peers	Never
1	Computers	☐	☐	☐	☐	☐
2	Mobile phones	☐	☐	☐	☐	☐
3	Internet	☐	☐	☐	☐	☐
4	Scanners	☐	☐	☐	☐	☐
5	*	☐	☐	☐	☐	☐
6	*	☐	☐	☐	☐	☐
7	*	☐	☐	☐	☐	☐
8	*	☐	☐	☐	☐	☐

13. How do you acquire new computer skills when you need them? (Select the most important **TWO methods)**

1	Teach myself	☐
2	Ask a colleague or friend	☐
3	Formal courses	☐
4	Training courses at my university	☐
5	Others ☐ please specify:	

14. How often do you use the Internet for the following activities?

NO	Activities	All the time	Most of the time	Some of the time	Seldom	Never
1	Direct Presentation	☐	☐	☐	☐	☐
2	Provide instructions	☐	☐	☐	☐	☐
3	Assess my students works	☐	☐	☐	☐	☐
4	Directing and providing help to individual learners	☐	☐	☐	☐	☐
5	Organise communication between students	☐	☐	☐	☐	☐
6	Collaborate with other designers (local and international)	☐	☐	☐	☐	☐
7	Prepare my traditional lectures	☐	☐	☐	☐	☐

SECTION (2): QUESTIONNAIRE'S STATEMENTS

❖ Please read the statements carefully and select **ONLY ONE** answer that represents your opinion by putting (✓) in the relevant square (☐).

No	STATEMENTS	SCALE				
		5	4	3	2	1
		Strongly Agree	Agree	Disagree	Strongly Disagree	Neutral/undecided
15.	The use of ICT integration can replace face-to-face contact to develop idea development in graphic design education.	☐	☐	☐	☐	☐

No	STATEMENTS	SCALE				
		5	4	3	2	1
		Strongly Agree	Agree	Disagree	Strongly Disagree	Neutral/undecided
16.	During my teaching, I always have direct face-to-face contact with my students on idea development.	☐	☐	☐	☐	☐
17.	ICT integration enables collaboration between institutions.	☐	☐	☐	☐	☐
18.	ICT integration increases the quality of teaching idea development in graphic design.	☐	☐	☐	☐	☐
19.	My university provides any needed support to improve ICT integration in my teaching.	☐	☐	☐	☐	☐
20.	All software required for teaching and learning are available in my faculty.	☐	☐	☐	☐	☐
21.	Network capabilities available permit creation of engaging interactive in teaching idea development.	☐	☐	☐	☐	☐
22.	ICT integration can be used for on-campus teaching in idea development order to increase the rate of interaction.	☐	☐	☐	☐	☐
23.	My students usually use ICT in their idea development in design process	☐	☐	☐	☐	☐
24.	ICT integration can help me to control and manage a large number of students in their idea development.	☐	☐	☐	☐	☐
25.	On-line experiences are seen to be as good as traditional teaching methods of idea development.	☐	☐	☐	☐	☐
26.	Digital experiences are better than traditional teaching methods in idea development.	☐	☐	☐	☐	☐
27.	The use of ICT in teaching offers a better opportunity for providing more individualized instruction.	☐	☐	☐	☐	☐
28.	Digital methods can develop students' ability to design and create new ideas in the design process.	☐	☐	☐	☐	☐
29.	Teaching and learning environments in the use of ICT* is difficult to run with idea development in graphic design.	☐	☐	☐	☐	☐

No	STATEMENTS	SCALE				
		5	4	3	2	1
		Strongly Agree	Agree	Disagree	Strongly Disagree	Neutral/undecided
30.	ICT assist in terms of motivating and structuring collaboration when applying to group-based project methods of teaching.	☐	☐	☐	☐	☐
31.	It is the quality of interaction that determines if real learning takes place in idea development.	☐	☐	☐	☐	☐
32.	ICT allow my design students to collaborate in group-based project work.	☐	☐	☐	☐	☐
33.	ICT provides a useful model of self-lifelong learning for graphic design students in idea development.	☐	☐	☐	☐	☐
34.	ICT supports students' collaboration and extends a working group that involves experts in the industry.	☐	☐	☐	☐	☐
35.	ICTs do not adequately assist for teaching idea development in graphic design.	☐	☐	☐	☐	☐
36.	My faculty provides continuing education in ICT for academic staff.	☐	☐	☐	☐	☐
37.	Generally, my students are interested in using the web and the Internet in their learning.	☐	☐	☐	☐	☐
38.	A blend of on-line and face-to-face teaching is the best current option for teaching idea development in my class.	☐	☐	☐	☐	☐
39.	My students are more interested in ICT with their idea development than face-to-face studio teaching.	☐	☐	☐	☐	☐
40.	My students have the necessary computer skills to manage idea development tasks in their design process.	☐	☐	☐	☐	☐
41.	I feel I need advanced courses in using the Internet and ICT integration.	☐	☐	☐	☐	☐
42.	I have a good background on ICT integration in my course.	☐	☐	☐	☐	☐
43.	Studio activities cannot be delivered on-line when it comes to idea development.	☐	☐	☐	☐	☐

No	STATEMENTS	SCALE				
		5	4	3	2	1
		Strongly Agree	Agree	Disagree	Strongly Disagree	Neutral/undecided
44.	The ICTs infrastructure at my university is not at the required level of quality teaching with idea development.	☐	☐	☐	☐	☐
45.	ICT can enhance the teaching of idea development in my course.	☐	☐	☐	☐	☐
46.	ICT can effectively enhance the teaching outcomes in graphic design as far as idea development is concern.	☐	☐	☐	☐	☐
47.	I do not trust the use of ICT in teaching my courses.	☐	☐	☐	☐	☐
48.	Large numbers of students in my class makes it uncomfortable with ICT integration.	☐	☐	☐	☐	☐

SECTION (3): OPEN-ENDED QUESTIONS

❖ Please write your answer in the spaces provided and summarise your answer where possible.

49. What difficulties do you encounter when using ICTs and the Internet in your teaching?

1. _____
2. _____
3. _____
4. _____
5. _____

50. How do you feel about using ICTs and the Internet for teaching idea development in design?

51. What are your expectations for on-line graphic design education in the near future at your university?

52. Can you suggest anything for improving graphic design education in your faculty in the era of ICT?

1. _____
2. _____

3. _____
4. _____
5. _____

53. What support do you need in order to optimally utilize ICTs in graphic design education, especially in idea development?

SECTION (4): GENERAL INFORMATION

- ❖ Please answer the questions by putting (✓) in a relevant square (☐) or by writing your answer in a space provided.

54. Gender

Male	☐
Female	☐

55. Age range

20-25	26-30	31-35	36-40	41 - 45	46 -50	Over 50
☐	☐	☐	☐	☐	☐	☐

56. The academic qualification

Diploma	Bachelor	Honours	High diploma	Masters degree	PhD	Post PhD
☐	☐	☐	☐	☐	☐	☐

57. Specialisation

58. Occupation/Status

Lab technician	Teaching assistant/ Tutor	Lecturer	Senior lecturer	Associate professor	Professor	Head of Department	Dean
☐	☐	☐	☐	☐	☐	☐	☐

59. Years of experience

1-5	6-10	11-15	16-20	21-25	Above 25
-----	------	-------	-------	-------	----------

☐	☐	☐	☐	☐	☐
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

60. Are you part-time or full-time lecturer?

Part-time	☐
Full-time	☐

61. What is the title of the main course you usually teach?

62. What is the nature of this course? (Please indicate **ONLY ONE** answer)

More than 50% Theoretical	More than 50% Practical	50% each (Theory and Practical)	100% Theoretical	100% Practical
☐	☐	☐	☐	☐

63. What is the class size of this course?

Less than 50	50 - 60	61 - 80	81 - 100	More than 100
☐	☐	☐	☐	☐

64. How many hours of the main course do you teach per semester?

If you have any comments to share about this questionnaire or the study, please write them below:

The END of the questionnaire. Thank you for your co-operation

- **PLEASE RETURN THE COMPLETED QUESTIONNAIRE TO THE RESEARCHER/RESEARCH ASSISTANT VISITING YOUR FACULTY WHO HANDED THE QUESTIONNAIRE TO YOU.**

APPENDIX B: QUESTIONNAIRE FOR DESIGN STUDENTS



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QUESTIONNAIRE FOR GRAPHIC DESIGN STUDENTS

This study is part of my doctoral studies in ICT in graphic design education. The questionnaire seeks to explore the possibilities of ICT as a mediation tool in teaching IDEATION in graphic design in developing countries. This in a way is to enhance graphic design education in the wake of ICT. I ask for your help to achieve this purpose.

This study's findings will hopefully assist graphic design educators to evolve an ICT framework that will fit the realities in the current system, help facilitate better ICT integration and possibly online design education in a public university in a developing country. The emerging strategy would ideally be adjustable and context-responsive to allow for application in similar design-related areas.

It is vital all your answers are accurate and honest. Your answers to this questionnaire will not be disseminated further. While the result of these study presumptions will be published, I vouch for the higher level of confidentiality and privacy about all information given, including your names, faculties and personnel.

Please complete all questions. For questions or comments about this questionnaire, or if you require information about the study, please feel free to contact or e-mail me at:

Cell: (+27) 73-609-7480

E-mail: appiahe@cput.ac.za or eddappiah@gmail.com

Thank you all for being willing to complete this questionnaire. I look forward to publishing and sharing the anonymous outcomes of this study with our African community.

Please understand that participating in this survey is voluntary and any one may withdraw at any time.

Edward Appiah
Researcher

SECTION (1): ACCESS TO ICTs AND THE INTERNET

- ❖ Please answer the questions by putting (✓) in a relevant square (□) or by writing your answer in a space provided.
- ❖ * ICTs (Information and Communication Technologies) refer to computers, computer infrastructure and any associated technologies, including software, hardware, and Internet connectivity.

1. On average, how often do you enter the campus during the semester?

Never	Monthly	Weekly	Daily
☐	☐	☐	☐

2. Where do you use the Internet on campus? (You may indicate **MORE THAN ONE** answer)

Lecture room	Computer laboratory	Library
☐	☐	☐
Other ☐ (please specify):		

3. Which of the following devices do you have? Is it connected to the Internet?

	Desktop PC		Laptop		Cellphone		Personal digital assistant (PDA)	
Availability	☐		☐		☐		☐	
Internet connectivity	Yes ☐	No ☐	Yes ☐	No ☐	Yes ☐	No ☐	Yes ☐	No ☐
Other ☐ (please specify):								

4. Do you own it?

Yes	No
☐	☐

5. How often do you use the above devices for academic purposes?

	All the time	Most of the time	Some of the time	Seldom	Never
Desktop PC	☐	☐	☐	☐	☐
Laptop	☐	☐	☐	☐	☐
Cellphone	☐	☐	☐	☐	☐
Personal digital assistant (PDA)	☐	☐	☐	☐	☐

6. Could you estimate how many hours daily you spend on the Internet?

1-3	4-5	6-8	9-10	11-15
☐	☐	☐	☐	☐

7. Can you estimate how many hours spent daily on the Internet involve your coursework?

1-3	4-5	6-8	9-10	11-15
☐	☐	☐	☐	☐

8. Where do you access the Internet? (You may indicate **MORE THAN ONE** answer)

On-campus	At home	Internet café	On my cell phone
☐	☐	☐	☐
Other ☐ please specify:			

9. How easy/difficult is it for you to access the Internet on campus?

Very difficult	Difficult	Easy	Very easy
☐	☐	☐	☐

10. How easy/difficult is it for you to access the Internet at home/residence?

Very difficult	Difficult	Easy	Very easy
☐	☐	☐	☐

11. Do you execute any assignment/project of your course using computers?

Yes	NO
☐	☐

12. If yes, where do you execute such assignment/project? (You may indicate **MORE THAN ONE** answer)

On-campus	At home	Internet café	On my cellphone
☐	☐	☐	☐
Other ☐ please specify:			

13. How do you acquire new computer skills when you need them? (Select the most important **TWO** methods)

1	Teach myself	☐
2	Ask a colleague or friend	☐
3	Formal credit courses	☐
4	Training courses at home	☐
5	As I do my assignments	☐
6	Other ☐ (please specify):	

14. How often do you use the ICT (including the Internet) for the following activities?

NO	Activities	All the time	Most of the time	Some of the time	Seldom	Never
1	Use to sketch ideas for your work	☐	☐	☐	☐	☐
2	Asking for help from your lecturer	☐	☐	☐	☐	☐
3	Communicate with a colleague on academic activities.	☐	☐	☐	☐	☐
4	Seek academic information using search engines.	☐	☐	☐	☐	☐
5	To submit your homework and tasks.	☐	☐	☐	☐	☐
6	Execute your final ideas after initial pencil sketches.	☐	☐	☐	☐	☐
7	Research design ideas for your briefs and sketches	☐	☐	☐	☐	☐

SECTION (2): QUESTIONNAIRE'S STATEMENTS

- ❖ Please read the statements carefully and select **ONLY ONE** answer that represents your opinion by putting (✓) in a relevant square (☐).

No	STATEMENTS	SCALE				
		5	4	3	2	1
		Strongly Agree	Agree	Disagree	Strongly Disagree	Neutral/ undecided
15.	All the time I need face-to-face contact with my lecturers for my brainstorming process.	☐	☐	☐	☐	☐
16.	Much of my brainstorming and sketching for my work is done on computer	☐	☐	☐	☐	☐
17.	All needed software for my learning is available through my faculty.	☐	☐	☐	☐	☐
18.	My lecturers often encourage me to use Internet and ICT for brainstorming and sketching for my ideas	☐	☐	☐	☐	☐
19.	Usually I find sketching and brainstorming on the computer interesting and useful.	☐	☐	☐	☐	☐

No	STATEMENTS	SCALE				
		5	4	3	2	1
		Strongly Agree	Agree	Disagree	Strongly Disagree	Neutral/ undecided
20.	ICT integration assists me to contact my colleagues in order to solve some design problem when we cannot meet on campus.	☐	☐	☐	☐	☐
21.	Brainstorming and sketching on the computer experiences can be shown to be as good as doing it on paper.	☐	☐	☐	☐	☐
22.	Brainstorming and sketching on the computer develop my ability to design.	☐	☐	☐	☐	☐
23.	I use computer to do all brainstorming and sketches for my work.	☐	☐	☐	☐	☐
24.	Brainstorming and sketching on the computer develop new skills based on industry needs.	☐	☐	☐	☐	☐
25.	I feel my academic performance is better with brainstorming and sketching with ICT.	☐	☐	☐	☐	☐
26.	I think the Internet is a vital tool in my brainstorming process as a design student	☐	☐	☐	☐	☐
27.	The web and ICT allow me to collaborate in group-based project work.	☐	☐	☐	☐	☐
28.	ICT methods and technologies provide me with a useful model for learning to brainstorm.	☐	☐	☐	☐	☐
29.	ICT methods facilitate self-learning tasks to help me to be a participant rather than merely an onlooker at lectures	☐	☐	☐	☐	☐
30.	The Internet allows me to gain inspiration from works of other students and experts in the design field.	☐	☐	☐	☐	☐
31	It is easy to use ICT in my sketching and brainstorming process in graphic design.	☐	☐	☐	☐	☐
32	Generally, I am interested in using ICT for my sketches and brainstorming.	☐	☐	☐	☐	☐
33	A blend of on-line and face-to-face teaching will make my graphic design course active and enjoyable.	☐	☐	☐	☐	☐
34	I am able to access the Internet sufficiently for idea development.	☐	☐	☐	☐	☐

No	STATEMENTS	SCALE				
		5	4	3	2	1
		Strongly Agree	Agree	Disagree	Strongly Disagree	Neutral/ undecided
35	I have the necessary computer skills to do my sketches and brainstorming.	☐	☐	☐	☐	☐
36	ICT allows me to be very fast and fantastic in my sketches, thinking and brainstorming.	☐	☐	☐	☐	☐
37	I would like to develop my sketches, thinking and brainstorming skills in using ICT facilities.	☐	☐	☐	☐	☐
38	I prefer to sketch, brainstorm and generate my ideas using ICT.	☐	☐	☐	☐	☐
39	ICT help me to improve my idea development skills.	☐	☐	☐	☐	☐
40	I feel I need advanced training in using the ICT for brainstorming and sketching.	☐	☐	☐	☐	☐
41	I have a good background about usage of ICT in brainstorming and sketching for ideas.	☐	☐	☐	☐	☐
42	Work done with computers are highly appreciated by lecturers	☐	☐	☐	☐	☐
43	It is difficult for me to use ICT in my idea development activities.	☐	☐	☐	☐	☐
44	The large number of students in my class makes it difficult to sketch with computers in class.	☐	☐	☐	☐	☐
45	I would like my lecturers to encourage the use of ICT in the sketching and brainstorming process.	☐	☐	☐	☐	☐

SECTION (3): OPEN-ENDED QUESTIONS

- ❖ Please write your answer in the spaces provided and summarise your answer where possible.

46 What do you think about BRAINSTORMING AND SKETCHING in design process using ICTs?

47 What are the difficulties facing you with BRAINSTORMING AND SKETCHING using the computer?

1. _____
2. _____
3. _____
4. _____
5. _____

48 What are your suggestions for improvement as far as the difficulties (if any) are concern?

1. _____
2. _____
3. _____
4. _____
5. _____

If you have any comments to share about this questionnaire or the study, please write them below:

SECTION (4): GENERAL INFORMATION

- ❖ Please answer the questions by putting (✓) in a relevant square (☐) or by writing your answer in a space provided.

49 Gender

Male	☐
Female	☐

50 Age

51 The current level of study

NO	Degree	Year				
		1 st	2 nd	3 rd	4 th	5 th
1	3/year diploma	☐	☐	☐	☐	☐
2	Bachelor	☐	☐	☐	☐	☐
3	High diploma	☐	☐	☐	☐	☐
4	Masters	☐	☐	☐	☐	☐
7	Other ☐ please specify:					

52 Specialisation

--

53 University

Kwame Nkrumah University of Science and Technology (KNUST)	☐
Cape Peninsula University of Technology (CPUT)	☐

54 Are you a part-time or a full-time student?

Part-time	☐
Full-time	☐

The END of the questionnaire
Thank you for your co-operation

- **PLEASE RETURN THE COMPLETED QUESTIONNAIRE TO THE FIELDWORKER VISITING YOUR FACULTY WHO HANDED THE QUESTIONNAIRE TO YOU.**

OPTIONAL

- ***Please tick box if you will be ready and available for follow-up interview:***

☐ I am available for a possible follow-up interview

Name:.....

Cell/phone #.....

Email:

APPENDIX C: PERMISSION LETTER FROM HEAD OF DEPARTMENT



Cape Peninsula
University of Technology

Department of Graphic Design
Faculty of Informatics and Design
Cape Peninsula University of Technology
Cell: +27 (0) 73-609-7480
Fax: +27 (0) 21-469-1002
e-mail: appiah@cput.ac.za
eddappiah@gmail.com
Web: www.cput.ac.za

December 12, 2011

**The Head of Department
Department of Communication Design,
Faculty of Art, KNUST**

Dear Sir

PERMISSION TO ADMINISTER QUESTIONNAIRE TO GRAPHIC DESIGN LECTURERS AND STUDENTS

I write to ask permission to distribute my questionnaire in seeking some information from students and lecturers in your department.

This study is part of my doctoral studies in ICT in graphic design education. The questionnaire seeks to explore the possibilities of ICT as a mediation tool in teaching IDEATION in graphic design in developing countries. This in a way is to enhance graphic design education in the wake of ICT.

This study's findings will hopefully assist graphic design educators to evolve an ICT framework that will fit the realities in the current system, help facilitate better ICT integration and possibly online design education in a public university in a developing country. The emerging strategy would ideally be adjustable and context-responsive to allow for application in similar design-related areas.

Answers to this questionnaire will not be disseminated further. While the result of these study presumptions will be published, I vouch for the higher level of confidentiality and privacy about all information given, including your names, faculties and personnel.

Please participating in this survey is voluntary and any one may withdraw at any time.

For questions or comments about this questionnaire, or if you require information about the study, please feel free to contact or e-mail me at: Cell: (+27)73-609-7480 e-mail: appiah@cput.ac.za or eddappiah@gmail.com

I hope my permission will be granted. Thank you

Edward Appiah
(Researcher)

Cc: Prof. Johannes C. Cronje (Supervisor)



2 *Approved*
[Signature]
K.G. *[Signature]*
12/12/11

**HEAD OF DEPARTMENT
DEPT. OF COMMUNICATION DESIGN
FACULTY OF ART
COLLEGE OF ART & SOCIAL
SCIENCES, KNUST-KUMASI**

APPENDIX D: COPY OF CONSENT LETTER FOR RESPONDENTS



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Faculty of Informatics and Design
Cape Peninsula University of Technology
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Fax: +27 (0) 21-469-1002
e-mail: appiah@cput.ac.za
eddappiah@gmail.com
Web: www.cput.ac.za

Dear Participant,

The following information is provided for you to decide whether you wish to participate in the present study. You should be aware that you are free to decide not to participate or to withdraw at any time without affecting your relationship with the researcher, or the Cape Peninsula University of Technology.

As part of my doctoral studies in ICT in graphic design education, I will like to interview you on some issues concerning ICT in Idea Development. The purpose of this study is to explore the possibilities of ICT as a mediation tool in the teaching of IDEATION in graphic design within a developing country. This in a way is to enhance graphic design education in the wake of ICT.

This study's findings will hopefully assist graphic design educators to evolve an ICT framework that will fit the realities in the current system, help facilitate better ICT integration and possibly online design education in a public university in a developing country. The emerging strategy would ideally be adjustable and context-responsive to allow for application in similar design-related areas.

It is vital all your answers are accurate and honest. Your answers to this questionnaire will not be disseminated further. While the result of these study presumptions will be published, I vouch for the higher level of confidentiality and privacy about all information given, including your names, faculties and personnel.

Do not hesitate to ask any questions about the study either before participating or during the time that you are participating. I would be happy to share my findings with you after the research is completed. However, your name will not be associated with the research findings in any way, and your identity as a participant will be known only to the researcher.

There are no known risks and/or discomforts associated with this study. The expected benefits associated with your participation will be, as a graphic design educator, the findings can help you and your institution, to evolve an ICT framework that will fit the realities in the current system and help facilitate better ICT integration as far as design education is concern.

Please sign your consent with full knowledge of the nature and purpose of the procedures. A copy of this consent form will be given to you to keep.


Signature

10/1/12
Date